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Contractors and Engineers Monthly

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Highlights Of This Issue

- **Maintenance of Equipment**
  The care and maintenance of equipment is a subject of great importance to every contractor and state and county highway department. The use of simple forms, making it easier for the operator and mechanic to make his daily inspection of every piece of equipment thoroughly, has resulted in at least a 5 per cent saving on maintenance costs in the Pennsylvania Department of Highways. See page 2.

- **Narrow Underpass Eliminated**
  The elimination of the traffic hazards due to blind S-curves and a narrow underpass beneath the B & M railroad in Maine was accomplished last autumn by the construction of a new straight overpass. Preliminary soil studies and a slide during construction were unusual features of the approach fill of this concrete overpass. See page 2.

- **Dragline Cuts Slope**
  A dragline with a 70-foot cable was used by a Mississippi contractor to reslope banks as high as 34 feet along U.S. 80 near Vicksburg, handling a total of 20,000 cubic yards. See page 2.

- **Open Cut for City Subway**
  The second article in the series on the work on Section 6 of the new Sixth Avenue subway in New York City, this one describing the open-cut excavation, appears in this issue. See page 5.

- **Experimental Road-Mix**
  More on Arkansas' road-mix highway construction in 1937, this time on the experiments with RC-3 asphalt and dense graded aggregate sealed with asphalt emulsion. See page 8.

- **Counties to Rebuild Highway**
  The plans of the Coastal Highway District, made up of six counties in Georgia, to widen and rebuild the Atlantic Coastal Highway from Savannah to the Florida state line and the proposed arrangement for financing the work are described in this issue. See page 17.

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C. & E. M. Photo
Spreading the Emulsion Mix on a 6.4-Mile Project in Marion County, Ind.

Emulsion Pre-Coat In Marion County

United Efforts of County And WPA Assemble Labor, Materials and Equipment For 6.4-Mile Paving Job

(Photo on page 36)

✦ THE OLD gravel road running both west and south from Lawrence, Marion County, Ind., had reached such a condition that maintenance costs were beyond all reason for the shape in which it was possible to keep the rapidly deteriorating surface. A WPA project was instituted to pave the entire 6.4 miles with wedge courses and a 1-inch wearing surface of emulsion pre-coat asphalt mix.
(Continued on page 11)

Crushed Granite and Tar Used in Vermont Road-Mix

(Photos on page 36)

Chas. E. Horne Completed Gravel Base and Mixed Top On Highway Contract Near Groton, Vt.

✦ STARTING at the memorial tablet to "The Sleeping Sentinel" of Civil War fame at Groton, Vt., Charles E. Horne of Millbury, Mass., built 5.192 miles of mixed-in-place road surface on a 12 to 24-inch gravel base through the scenic grandeur of the Vermont countryside during the summer of 1937.

Grading

The grading on the job was done with three Thew-Lorain 75's and a Marion Type 7 steam shovel working in the gravel pit. Two International T-40 tractors with Wood bulldozers and two T-20's with the same type of bulldozers worked the gravel base into place and handled the fills ahead of the Gilbert and Wehr power graders. The excavation throughout the job was a very coarse gravel filled with boulders of one and two-man stone. The job was graded during the autumn of 1936 and then the contractor shut down from Thanksgiving until May 15 when the job was still too wet to run smoothly. The gravel base was left about 4 inches low and in the spring just before the work started on the surface course the subbase was brought up to grade with a light layer of fine gravel. The roadway was 18 feet wide with 2 feet added on curves for safety.

The Road-Mix

The first operation after the base was completed was the tack coat to furnish a bituminous surface for the mixing operations with the granite chips. The tack coat was of tar applied from a pressure distributor at the rate of 0.33 gallon per square yard. This was done for the full length of the job just before the granite was hauled in.

The contract was originally designed for gravel and tar but the contractor had found that the cost of processing the gravel available would be greater than the cost of hauling crushed granite a distance of 15 miles to the job. Permission was secured to substitute the crushed granite for the gravel. It is interesting to note that in the crushing of the granite for the road-mix aggregate the percentage of fines secured was exactly the amount needed for the pea-stone seal, or about 100 cubic yards per mile. The aggregate ran from 1¾ down to ¾-inch screen size.

The granite was delivered to the job by a subcontractor and spread 8 inches deep and 7½ feet wide with a Burch spreader box, thus giving the correct amount for a 2½-inch layer over the 18-foot width of the road. The material was spread 9 inches thick on curves to take care of the extra 2 feet of width. In all cases the material was spread on the high side of super-elevated curves, and the job was largely curves, and a distance of at least 25 feet was skipped when changing from one side to the other so that traffic could easily run
(Continued on page 19)

Effective Form Work For 420-Foot Bridge

(Photos on page 36)

The Halloran Co. Completed Creosoted Pile and Concrete Structure on U. S. 61 near Vicksburg, Miss.

✦ THE CROSSING of the bayou on the old Massey plantation on U. S. 61 some 10 miles south of Vicksburg, Miss., has presented a problem to several generations of highway engineers. The latest relocation of the highway, which will be part of a scenic route south to Baton Rouge, La., and New Orleans from historic Vicksburg, makes use of a short low bridge, a short fill and a big brother of the small bridge, measuring some 420 feet in length. While the structure itself is standard creosoted timber piling bents and caps with I-beam stringers and concrete slab and hand rail, the contractor, The Halloran Co. of Memphis, Tenn., used some original methods in handling the form work which are worthy of record.

Details of Bridge

The longer structure to which this article will be confined consists of twenty-one 20-foot spans carried on twenty 4-pile bents and two 6-pile abutments. The bents of creosoted piles have the two outer piles driven on a slight batter and the two inner vertical. The piles are covered with asphalt seal coats and
(Continued on page 18)

C. & E. M. Photo
Perspective View of Bayou Massey Bridge, Showing Pile Bents and Hand-Rail Forms

Preventive Maintenance Of State Road Equipment

Simple Forms Make It Easier To Check Lubrication and Care for Pennsylvania Motor Units

✦ FOR more than a year special forms developed by the Equipment Bureau of the Pennsylvania Department of Highways have been used for a continuous lubrication and service report of every one of the 4,200 pieces of motorized equipment owned by the Department. "Making it easier for the operator and the mechanic to make his inspection thoroughly," is the way G. R. Tyler, Equipment Engineer, characterizes the service rendered by the reports, and Sherwood F. Ritz, Assistant Equipment Engineer, estimates that the use of the two daily reports on each and every piece of motor equipment has saved at least 5 per cent on maintenance costs. Engineers of oil companies who have examined the system place the savings as high as 70 per cent, basing their estimates on the cost of replacing expensive gears, bearings, motor blocks, and many times entire assemblies that might be damaged due to faulty lubrication.

Operators' Daily Reports

The man who drives a motor car, truck or any piece of motor equipment knows when something is going wrong with the machine. He can tell by the way it pulls, any unusual noise or the way the engine performs, that something is not as it should be. It is to catch these troubles as they develop and prevent their becoming major repair jobs that each operator is required to turn in a daily report on Form 614 "Overnight Repairs to Department Equipment." These are mimeographed 8½ x 11 sheets at the top of which the operator records his name, make of equipment, mileage, kind of equipment, the Department number of the machine, and the license number. Then there is a list of all the parts where there might be trouble and sufficient space at the right of the list for the operator to note the minor repair or adjustment that is required. The list of parts of each piece of equipment where the trouble might lie is as follows: engine, ignition, muffler, radiator and cooling system, gasoline system, steering gear, lights, brakes—foot, brakes—emergency, clutch, transmission, drive shaft, springs, axles, differential, wheels, tires and tubes, accessories, change oil, grease, car wash, battery, tightening, body. At the bottom of the Form 614 is further space for the operator to note any unusual trouble that cannot be entered in the small space to the right of the list. Below this under the heading "Repairs requested above have been completed" is space for the Chief Mechanic to sign and date the report.

This report must be turned in by every operator every night regardless of whether or not there are any defects to be reported. If there is no trouble to be reported he merely signs the report and marks it "OK" across the face and turns it in. This acts as a check on the more serious cumulative troubles that should have been reported as soon as noted by the operator. When the equipment is not returned to the garage at night the form is completely filled out and turned over to the road foreman and returned to the Chief Mechanic as soon as possible, usually with the daily time reports. In this case the Chief Mechanic arranges to have the repair made in the field or a substitute piece of equipment sent to the work while the unit is brought to the shop and repaired. In addition to cutting maintenance costs, this form helps to set up a safety campaign against accidents to department equipment.

As soon as a piece of equipment arrives at the shop at night the Chief Mechanic or his assistant inspects the machine and any additional defects found are entered on the upper part of the reverse of Form 614. The work necessary to be done is then assigned at once to a mechanic who initials the various items as he completes the work. Upon the completion of all the work the equipment is again inspected by the foreman or his assistant and approved. Defects that were reported but not repaired are listed with the reasons for the failure to make the repair, on the lower part of the reverse of Form 614. These reasons might be that the necessary piston rings were out of stock and the running of the engine for another day or two until they arrived would do no appreciable damage to the cylinders.

In addition to the use of Form 614, the Equipment Bureau has been working out a more definite set-up for scheduled overhauls of the equipment as a part of the preventive maintenance program.

It is the law of the department that no one except the Chief Mechanic shall order any piece of equipment out to the road for any work whatsoever, and then only upon receipt of instructions by him from some one of designated authority in the Superintendent's office, with the assignment, route and foreman or caretaker's name on the job. This prevents the sending of equipment out where it is not needed or unauthorized use of equipment. Every piece of equipment owned by the highway department is rented to the district for the period it is in service and that rental becomes a charge against the work being done and is included in all cost accounting of work done and of equipment owned.

Another feature of the system is that no man is assigned to operate any piece of equipment merely because he happens to be an employe of the department. He is chosen from the list of men available because he has demonstrated his ability to operate efficiently a certain kind, or

(*Continued on page 9*)

C. & E. M. Photo

From Its High Position This Dragline Cut the 34-Foot Bank to a New Slope

Resloping Loess With a Dragline

J. B. Holland Used 70-Foot Cable on Machine at Top of 34-Foot Banks for Moving 20,000 Cubic Yards

✦ A BANK of river loess will stand for an endless period if the face is vertical and grass and other vegetation hangs over the top, preventing rain from washing the face. But once this condition is disturbed the material erodes very rapidly, forming unsightly gullies. If cut back to any slope other than vertical the face must be sodded with Bermuda grass— "or else".

Some of the high loess banks on U. S. 80 just east of Vicksburg, Miss., near the National Park, had begun to erode badly due to loss of some of the protective vegetation and a slight slope in the original face. During the summer of 1937 a contract was awarded to J. B. Holland of Meridian, Miss., for the resloping of these faces to a 1¼ to 1 slope. In a distance of 0.852 mile this contract required the removal of approximately 20,000 cubic yards from banks running as high as 34 feet.

The contractor put in a Link-Belt dragline with a 40-foot boom and a ¾-yard Page bucket with a 70-foot cable, making it possible to run the dragline to the top of the highest banks and drop the bucket to the roadway to pick up the material that had slid down the face from cuts higher up. Two flagmen were maintained at all times on the road to prevent any accident when the bucket was being dropped to roadway level.

As the hauls were negligible the contractor used two of his own trucks and two hired locally. The time lost was in maneuvering the trucks on top of the banks and on the close fills. Practically all material was wasted at the ends of the banks from which it was cut and adjacent fills were widened from 1 on 1 slopes to 1 on 3. The old 5-foot shoulders were widened to 8 feet to use up more of the material.

The widening of the fills made necessary the installation of thirteen new spillways to handle the surface water from the cuts, and the extension of several corrugated and reinforced concrete pipe culverts. Nine drop inlets were installed with a maximum depth of 15 feet and others as low as 3 feet. Each drop inlet was covered with a cast iron grating.

Roadside Clean-up

One of the most interesting features of this contract was the clean-up of a hole back of a popular road house. An old negro had lived in this hole-by-the-side-of-the-road for some twenty years in an old shack that had grown with age from a mere hovel to a straggling affair

(*Continued on page 20*)

Narrow Underpass Replaced in Maine

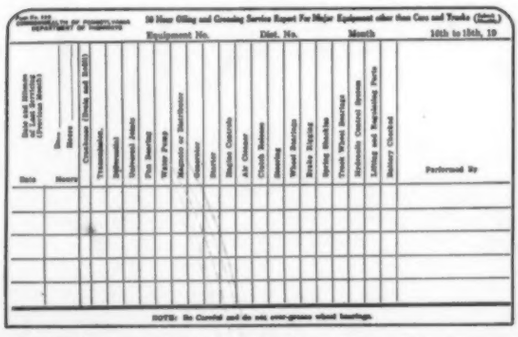
Blind S-Curves on U. S. 1 At an Old Underpass near Biddeford Eliminated by New Straight Overpass

(*Photos on page 36*)

✦ PREPAREDNESS in design to eliminate difficulties during construction is the aim of every engineer. Sometimes the best-laid plans miscarry because Mother Earth has many feminine characteristics and does not behave in the rational manner attributed to her by the male designer. Such an instance occurred during the construction of the new 0.373-mile overpass on U.S. 1 between Kennebunk and Biddeford, Maine. The new concrete structure with long gravel approach fills eliminated an existing narrow structure carrying a 2-lane highway beneath the two tracks of the Boston & Maine railroad and requiring a complete S-turn to get through the underpass. Accidents had become more numerous with increasing traffic so the reverse curve was eliminated and a wider roadway carried over the railroad by the new structure.

Explorations of the soil by borings and test pits showed a few inches of sod, then some 12 feet of stiff clay underlaid by an average of 10 feet of soft clay on ledge rock at the north approach fill and a thinner layer of the stiff clay and a thicker layer of the soft clay under the south approach fill. Realizing that there might be some movement of the underlying soft clay laterally, resulting in a bulge of the ground at some distance from the fill, plans were made for the relief of the pressure immediately adjacent to the fills by the excavation of relief trenches. For a short distance along the east side of the north approach fill and for a longer distance on the west side away from the old roadway, and along about two-thirds of the length of the south approach fill on the west side, the relief trenches were excavated for a width of 10 feet and an average depth of 12 feet. The proximity of the railroad and the old highway on the east side of the south approach fill and the old highway along the east side of the north approach fill made the excavation of the trenches in these locations im-

(*Continued on page 26*)

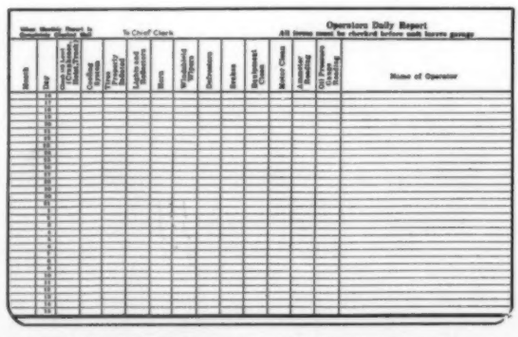


50 Hour Oiling and Greasing Service Report For Major Equipment other than Cars and Trucks

Equipment No. Dist. No. Month 16th to 15th, 19

Date	Hours	Crankcase (Drain and Refill)	Transmission	Differential	Universal Joints	Fan Bearings	Water Pump	Magneto or Distributor	Generator	Starter	Engine Controls	Air Cleaner	Clutch Release	Steering	Wheel Bearings	Brake Rigging	Spring Shackles	Front Wheel Bearings	Hydraulic Control System	Lifting and Regulating Parts	Battery Checked	Performed By

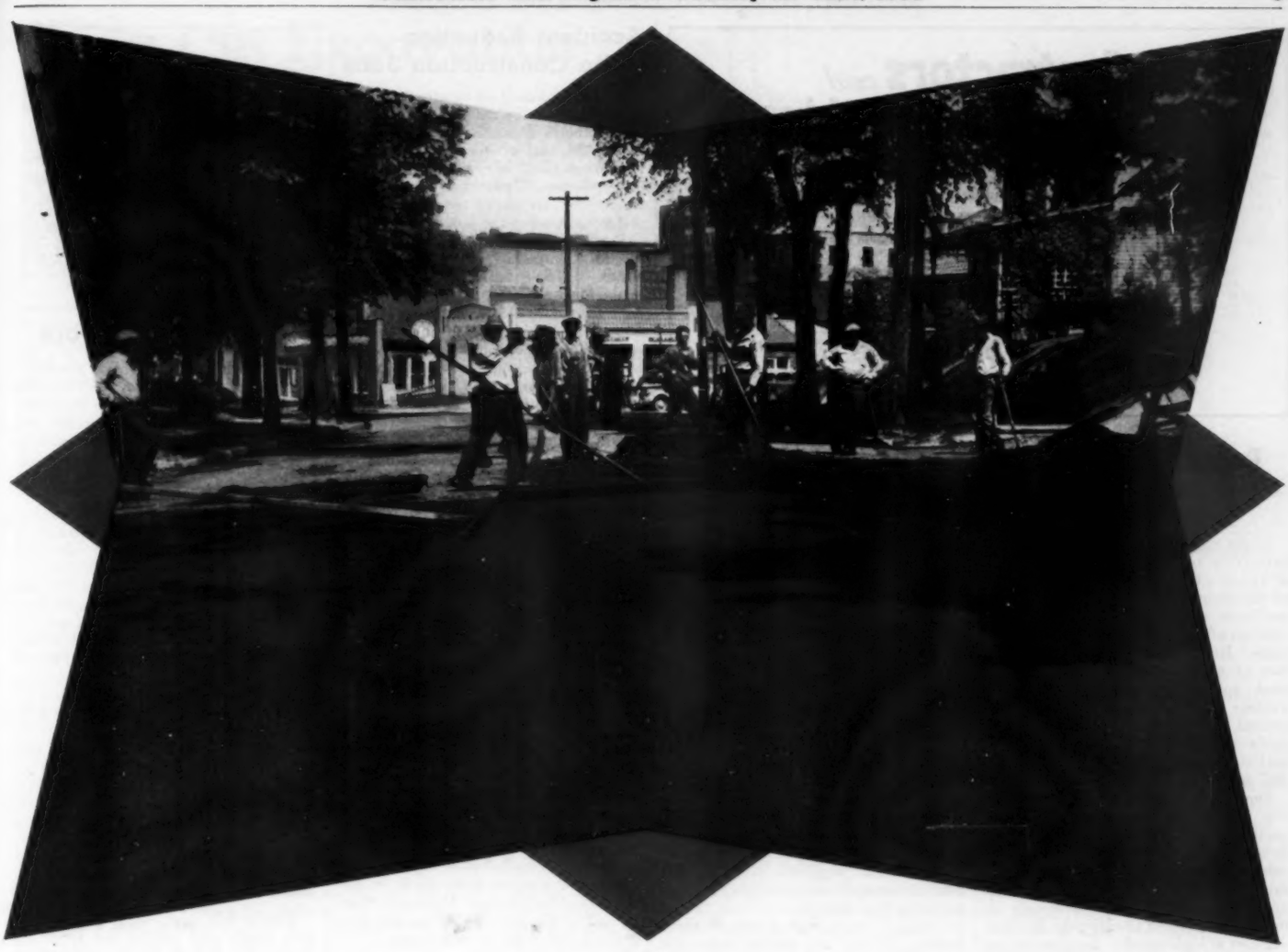
NOTE: Be Careful and do not over-grease wheel bearings.



Operators Daily Report. All items must be checked before cash leaves garage

Month	Day	Gas and Lube Tanks Filled Fresh	Cooling System	Tires Properly Inflated	Lights and Reflectors	Horn	Windshield Wipers	Defrosters	Brakes	Equipment	Minor Chec	Accident Reporting	Oil Pressure Gauge Reading	Name of Operator

Two of the Forms Used by the Equipment Bureau of the Pennsylvania Department of Highways in a Daily Check of Its Equipment



PAVING GANGS HAVE WORKED WITH IT A THIRD OF A CENTURY

Paving gangs have been turning out smooth, easy-riding TEXACO Asphalt pavements for approximately 33 years. These pavements today serve most of the largest cities east of the Rockies and many hundred smaller cities.

Machine-spreading gradually has been replacing gangs of shovelers and rakers. But whether they are using mechanical or hand-spreading methods, paving contractors today appreciate fully what TEXACO Asphalt's 33-year background means in quality of product, extent of resources and dependability of service.

TEXACO ASPHALT

THE TEXAS COMPANY, Asphalt Sales Department, 135 East 42nd Street, New York City

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Better Bases, Retread and Widening Modernize Our Highways

In the past decade highway engineers have come to realize that the subgrade of a road is the only real permanent part of the highway and consequently more and more attention has been paid to the creation of better-drained firmer foundations. Recently, through the introduction of soil studies of subgrades, the weak spots are located even in dry weather and corrected, so that when ground water enters the right-of-way again during winter rains capillarity will not be the destroyer of foundations and good surfaces.

During a two-months editorial field trip in seven southeastern states I was particularly impressed with the care being taken with the preparation of the subgrade of highways. So scientific has this become that all-weather roads are now built with a surface course only ¼ to 1½-inches thick to carry the heaviest vehicles at high speeds. Imagine trying this with the old "as is" subgrades of yesteryear! The present single and double bituminous surface treatments are little more than waterproofing with non-skid qualities but the load-carrying foundation has been strengthened by the addition of sand, or clay, or top soil as may be required for maximum density when compacted at optimum moisture content.

Today, thanks to an appreciation of and a constant endeavor to understand more completely the physical and chemical properties of the soils that nature provides, we are able to forge ahead with a program of construction that will provide a vast mileage of stabilized subgrades with low-cost surfacing sufficient to carry the present traffic and induced traffic for many years. The adequate subgrades being built today may well be the bases for heavier paving tomorrow as civil or military transportation demands. We are in the midst of a great program of stage construction. Prepare today's bases well and the heavy transport roads of tomorrow will have been half built.

Retread with both plant and road-mix is showing itself to be a form of intermediate stage construction that deserves more and more attention. The programs of retread in Indiana in the past will soon be but a small part of the vast network of primary and secondary highways which will be added to the easy-riding safe surfaced roads of the country. Old macadam, bituminous concrete, and portland cement concrete built on inadequate bases have become rough as the subgrade has settled to final compaction. Retread levelling and surface courses laid with new finishing and tamping machines convert these uneven surfaces into smooth lanes for high-speed travel and slower heavy transportation. Modern science furnishes low-cost bituminous mixtures, which can now be laid with well-designed modern equipment at a rapid pace, converting outmoded roads into modern highways.

Penetration, asphaltic concrete and portland cement concrete widening strips are being laid down many of our "horse and buggy" roads built in 16 to 20-foot widths, so that the newest passenger busses, the great freight trailers and the seemingly ever-present house trailer may travel safely at 50 mph without danger of sideswiping or forcing the timid driver off onto the shoulder.

The building of a widening strip on an old shoulder that has not had the pounding of traffic to compact it is a problem which requires the concerted efforts of the best minds among soils experts, highway engineers and contractors. The mere excavation of a widening trench, rolling the subgrade, filling with some stable material, and paving or placing a retread over the entire area is not all there is to it. Traffic makes the job look sorry in a short time with tell-tale settlement and cracks if the job has not been designed and built to give the same, or better, foundation to the widening strip as is afforded by the narrow pavement. Highway builders must not take the same attitude toward this as they held for so many years toward "low-cost" construction. "It's cheap, so why bother to put so much engineering thought and care into its construction?" That was an attitude that delayed the fullest development of a low-cost highway system in this country. Don't let a similar attitude hold back the safe widening of our main arteries to care for wider, heavier and denser traffic.

Czechoslovak Traffic Signs

The Ministerial Council of Czechoslovakia has approved a bill which imposes an obligation on the Government and municipalities to install within 3 years all necessary warning and traffic road signs on high roads and within town limits. The total expenditure which will be necessary for such a program is estimated at approximately 20,000,000 crowns.

The bill has been submitted to Parliament and a speedy passage is anticipated in view of the urgent need of facilitating international automobile tourist traffic throughout the country, according to a report from the U. S. Commercial Attaché in Prague. Thus far, the Czechoslovak Automobile Club of Prague has been in charge of installing and maintaining road signs but the service has been far from satisfactory because of the heavy expense involved. Some of the expense has been borne by the various domestic automobile manufacturers who used the back of the warning and traffic signals as an advertising medium.

Accident Reduction On Construction Jobs

Accident hazards on construction jobs can be materially reduced through the use of the safe practices recommended in the "Manual of Accident Prevention in Construction," according to the Associated General Contractors of America, which has just issued the 1938 second revised edition of the book.

Drawn up by a committee of leading general contractors, the manual discusses accident hazards and outlines methods to be followed in order to reduce them. An active campaign for the reduction of hazards to workmen, the public and property has been carried on by the A. G. C. since its inception and its accident prevention committee has gathered the experiences of members of the Association into this book for the guidance of contractors on their jobs.

The book is a pocket-size volume of 372 pages, well illustrated, and is conveniently arranged for quick practical use in the field. It gives concise fundamental information on safety and first aid, as well as presenting the details of accident prevention practice to be followed in various types of construction operations. Copies of this book may be secured from the Associated General Contractors of America, Inc., Munsey Bldg., Washington, D. C. Price: $2.00.

Southern Rhodesia Builds Highways Known as Stripped

The main roads of Southern Rhodesia in Africa are constructed of two asphalt strips on which the cars run and are known as stripped. This system costs less than full-width tar-macadam roads and enables the work of road improvements to go forward more rapidly. According to a report from the U. S. Bureau of Foreign and Domestic Commerce, at the end of 1937 there were about 1,300 miles of such roads.

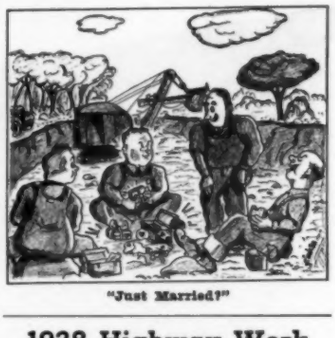
A.S.T.M. Committee on Soils For Engineering Purposes

The work of the A. S. T. M. Committee D-18 on Soils for Engineering Purposes which was formally organized during the past year is divided among eleven subcommittees, all of which presented reports during Committee Week of the American Society for Testing Materials.

The subcommittee on stabilization, divided into groups according to the various methods for stabilizing soils, has been studying the applicability of the general methods of tests of soils to the particular methods of stabilization. The portland cement group reported that four of the tests being considered are applicable to the study of soils stabilized with portland cement, these tests being for moisture density, freezing and thawing, wetting and drying, and shrinkage and swell. The calcium chloride group reported that the methods of tests for determination of percentage of voids and density were the only methods of those submitted for consideration which are applicable to the study of stabilization of natural soils with calcium chloride.

A method of test for determining the shear of soils in service in roads is being developed and the results obtained to date indicate that the method may present valuable data in regard to calcium-chloride and soil-bound mixtures. The subcommittee on compressibility and elasticity of soils presented a very satisfactory report on the correlation of the various methods of making tests on the compressibility of soils, with the purpose of developing a standard method.

Careful study has been made of present standard methods of tests of soils for engineering purposes and some recommendations for revisions to bring these methods up to date have been offered to the general committee.



"Just Married?"

1938 Highway Work

The slowing up in highway construction caused by the delay in releasing approval of highway projects under the 1939 Federal-Aid apportionments has now been overcome and the program is going forward in a normal way, according to a report from the American Road Builders' Association.

The U. S. Bureau of Public Roads has approved the Federal-Aid programs in twenty-seven states, the total estimated cost of this work being $142,045,600, of which $72,574,448 is from Federal funds. Secondary-road programs have been approved for twenty-five states at a total estimated cost of $18,908,360, which includes $9,525,709 of Federal funds. The grade-crossing elimination programs in fifteen states have been approved, at a total estimated cost of $13,169,346 of Federal funds.

The A. R. B. A. further reports that from information received from the various state highway departments it appears that the highway program for 1938 will at least equal that of 1937 and in some instances will be greater.

Minnesota Road Mileage

Minnesota's state, county and township roads total almost five times the distance around the world at the equator, according to the results of a recent compilation of county and township road mileages by the State Highway Department. Minnesota has 118,330 miles of all types of roads, with 3.8 per cent of the nation's 3,033,713 rural miles in contrast to only 1.2 per cent of the nation's population.

The state-operated trunk-highway system comprises 11,353 miles, county roads total 37,448 miles and township roads, 69,529 miles. Of the county roads, 14,680 miles are state-aid roads, paid for and maintained by the one-mill tax. Gas-tax roads, known as county-aid highways, total 22,768 miles.

There are 3,020 miles of paved highways in the state system, of which 2,757 miles are of portland cement, 101 miles of bituminous concrete, and 162 miles of all-type paving within cities. In addition there are 3,895 miles of bituminous surfaced highways, 3,997 miles of gravel and 441 miles of earth roads, of which 31 miles are graded and drained.

It costs Minnesota approximately $4,000,000 annually to maintain this system, which endures adverse conditions of temperature extremes, heavy snow and precipitation encountered in few if any other state maintaining so large a mileage.

Spanish Trail Superhighway Proposed by O. S. T. Assn.

A four-lane superhighway system along the Old Spanish Trail from St. Augustine, Fla., to San Diego, Calif., was proposed at the annual convention of the Old Spanish Trail Association, according to an Associated Press dispatch. The resolution calling on Congress for such a highway suggested a toll system to help finance the project which, it is estimated, would cost approximately $8,000,000,000.

Open-Cut Excavation On City Subway Job

Tight Suspended Sewers And Open Drains Make Job Dry Throughout; Use Pretest Underpinning

(*Photo on page 36*)

✦ THE problems faced by the contractors building various sections of the new Sixth Avenue subway in New York City are challenging and vary from section to section. Some contractors must carry the existing elevated railway structure over the entire excavation while Spencer, White & Prentis, Inc., on Section 6 from Waverly Place to 18th Street, is excavating beneath and on both sides of the Hudson & Manhattan tubes. By dint of careful planning and the most scientific methods of underpinning the Tube and adjacent office, business and domestic buildings, the contractor has contrived to work in poor soil without settlement of structures and with open excavation carried on with remarkable speed.

Upon the removal of the 4-inch sheet asphalt pavement and 8-inch concrete base with pneumatic equipment, the contractor excavates about 8 feet of the street with clamshell buckets, using a fleet of Speedcranes and Lorain 40 and Lorain 77 cranes with ¾-yard Owen clamshell buckets. Then 24-inch steel deck beams are placed transversely across the street, resting on short timber posts carried on the Hudson & Manhattan structure. These deck beams have a span of 40 feet from the Tubes to the building line where that end is incorporated in the combination underpinning of the building foundations. Where the structural steel columns of the elevated railway are met they are carried on independent pairs of 16 x 8-inch H beams just below the regular deck beams, with one end on the underpinning grillage and the other on the Hudson & Manhattan structure. These are entirely independent and have no connection whatsoever with the deck beams.

No vertical H-beam master piles are used on the Hudson & Manhattan side of the excavation until the excavation has been carried to the bottom of the Tube and then standard underpinning pits are excavated and Pretest piles driven by hydraulic jacks on 10-foot centers. As soon as any building foundation is exposed the needed grillage is inserted and a complete Pretest underpinning installed.

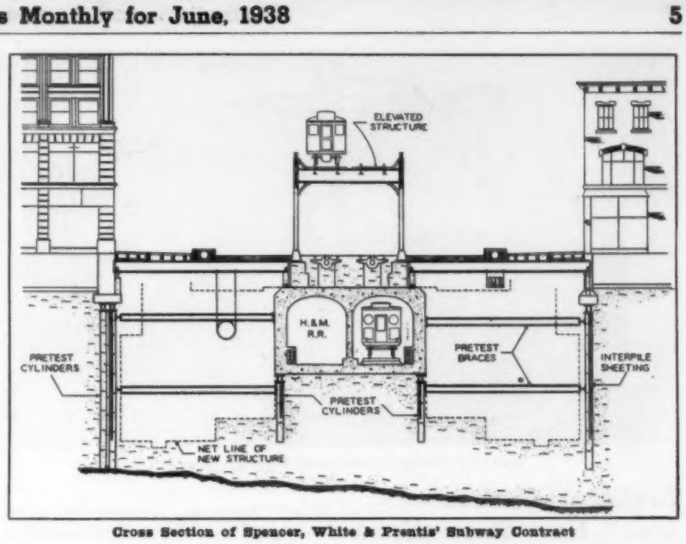
The first cross braces are set 10 feet below the surface of the street, just below the wedge beams on the underpinning piles carrying the buildings. These underpinning piles are on 10-foot centers and closer where required for carrying the structures. Ten x 10-inch steel wales are wedged against the underpinning piles to take the reaction from the cross braces. These steel wales are held with steel wedges, no wooden wedges being permitted on the job. A steel wedge once driven does not crush and release the load, while the fibres of a wood wedge or of timber may crush and the bracing system yield under the load.

The decking within the street area is 12 x 12 timbers resting on the 24-inch cross deck beams. The decking within the sidewalk area is composed of 6 x 12-inch timbers carried on the deck beams. A 4 x 6-inch straight-edge is laid 10 feet in from the gas bypass frame which runs along the edge of the sidewalk, permitting the use of standard 10-foot length timber between the bypass and the straight-edge. Odd lengths of timber are then used between the straight-edge and the buildings. This allows 10 x 10-foot panels to be picked up and replaced easily during excavation. Only one 10 x 10-foot hatch of the deck is removed where excavation is under way with a crane and ¾-yard bucket. In order to expedite excavation, a Caterpillar RD4 diesel tractor with a LaPlant-Choate hydraulic bulldozer is run in the bottom of the excavation to remove sand from the side of the cut and to spot it under the 10 x 10-foot hatch opening to be handled by the cranes. In this manner the contractor has been able to move regularly one yard of material a minute, since the crane handles loose material only.

Sewer and Water Lines

Sewer lines within an open-cut excavation are distinct hazards. A break in the line may flood the cut before it can be shut off and continual dripping from

(*Continued on page 22*)



Cross Section of Spencer, White & Prentis' Subway Contract

Significant Announcement

I CONSIDER this one of the most important and significant announcements that Barber-Greene has ever had the privilege of making, as it may lead to new trends in bituminous road construction.

We have demonstrated the ability of our Finisher to lay sheet asphalt as well as all other bituminous materials.

Hereafter, our Finishers will be furnished with heating equipment that will enable the user to spread, level, tamp, and iron sheet asphalt to unbelievable perfection. Heat is absolutely necessary for laying hot, tacky materials, and is of tremendous advantage in handling all kinds of bituminous materials. The hot air heating system is simple and not very expensive.

Engineers have been working on the problem of mechanizing the spreading of sheet asphalts for almost fifty years, and we have been working on this particular type of machine for seven years. Those who have witnessed recent demonstrations claim that it is the answer, and I do not hesitate to recommend it for every type of bituminous material that has come to our attention.

This is another Barber-Greene Machine that injects quality and lowers the cost of bituminous roads, or putting it another way . . . it permits the use of higher quality materials without greatly increasing the cost of the road.

Carefully study the significance of this announcement . . . also note the important new features embodied in our machine, and then write for further information.

We are in production, but current orders and shop capacity clearly indicate the importance of placing orders as soon as possible.

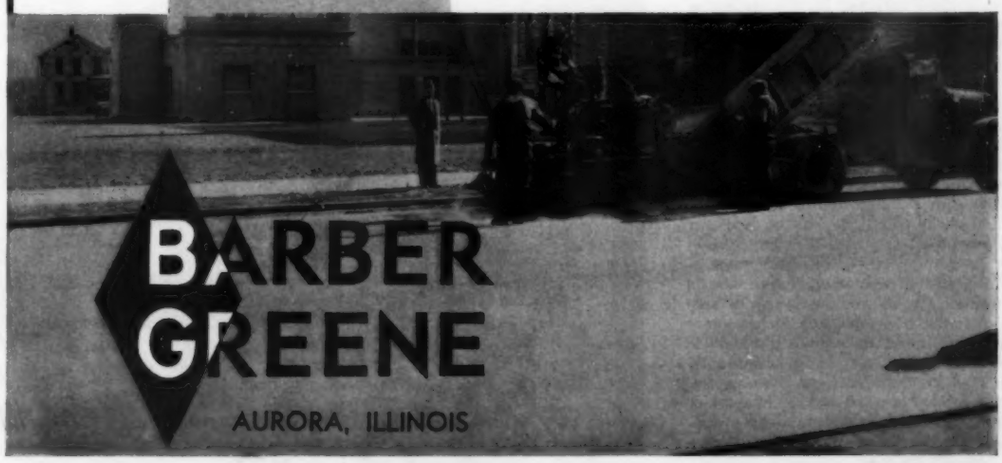
H. H. Barber

President Barber Greene Company.

REQUISITES OF MODERN FINISHER

- Continuous operation
- Ample crawler traction
- Automatic leveling without forms
- Ability to lay to grade
- Controlled spreading
- Tamping to permanent, uniform density
- Ability to lay thin courses
- Fool-proof thickness control
- Instant crown control
- Perfect matching of joints
- Operated from either side (dual controls)
- Variable width (8 to 12 feet)
- Agitator for unworkable, dead materials
- Heated screed for ironing all materials, including hot sheet asphalt

36-5



The New Cleaver Streamlined Tank-Car Heater

Tank-Car Heaters Now Streamlined

In addition to the modern streamlined styling of the new Cleaver steam tank-car heater recently announced by Cleaver-Brooks Co., Milwaukee, Wis., this new unit has a number of new operating features. One of these is the Cleaver continuous drainage system which keeps the tank-car coils bone dry, according to the manufacturer, with less than a gallon of make-up water required per hour. This return system is designed to bring the water back to the boiler at practically steam temperatures, thereby saving fuel and at the same time heating the material in the car more rapidly.

Under the steel covering of the unit is an efficient oil-burning steam-generating plant of the horizontal fire tube type, especially designed for burning fuel oils. The burner atomizes the fuel and a gasoline-driven blower furnishes the correct amount of air at the correct pressure to provide complete combustion. The gases are then forced four times downward through a long gas travel.

Insulation is furnished around the boiler shell, to prevent heat losses and over this is the streamlined sheet steel lagging. The oil burner and other operating machinery are also covered by sheet steel housing. The unit is self-contained and is mounted on a high-speed roller-bearing rubber-tired trailer for transportation from one location to another.

Hydraulic Hoists And Dump Bodies

Among the various models of hydraulic hoists and dump bodies made by the Perfection Steel Body Co., Galion, Ohio, are Models 6 and 67 heavy-duty hydraulic hoists for all short wheelbase 1½ and 2-ton trucks and Perfection Type 100 steel bodies up to and including 96 inches long, with normal capacities not exceeding 2½ cubic yards.

These two hoists have two heavy cast lifting arms actuated by the motion of the piston and connected to it by pull rods and chains. These arms impart an upward lifting motion, through two rigid widely spaced lifting links, directly to the understructure of the body, thus avoiding excessive weaving or strain in the body. The full floating cylinder assembly and equalizing crosshead are designed to prevent piston-rod binding or bending due to unequal distribution of the load in the body or distortion of the chassis frame caused by irregular road conditions.

A patented cushion-check mechanism automatically retards the downward motion of the body about 5 inches above the truck frame and allows the body to settle gently to its riding position without shock to the frame. Both models are mounted in a pressed steel subframe which distributes the load on the chassis frame and simplifies the mounting of hoist and body. A super-duty pump is designed to give these hoists dumping speed.

Complete information on these two models as well as the other models in the Perfection line of hoists and dump bodies is contained in literature which may be secured direct from the manufacturer by mentioning this magazine.

Two New Light Trucks

Lighter in weight and lower in price than any Mack trucks previously produced, two new models, the EE and EF, rated at 12,000 and 14,000 pounds gross respectively, have recently been announced by Mack Trucks, Inc., 34th St. & 48th Ave., Long Island City, N. Y.

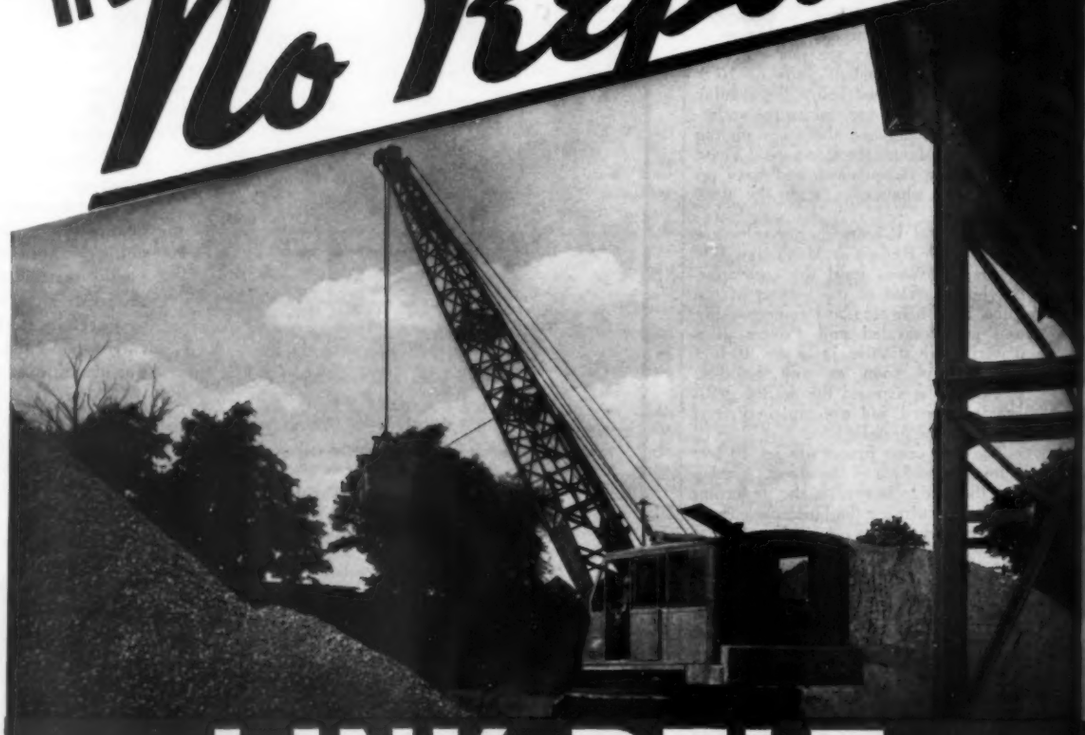
Model EE is powered by a 6-cylinder engine with 3½-inch x 4⅜-inch bore and stroke developing 75 hp at 2,800 rpm, and Model EF has a 3⅝-inch x 4⅜-inch power plant developing 78 hp at 2,800 rpm. The full counter-balanced crankshafts of both these new models have seven bearings and are of drop-forged heat-treated carbon steel. The cylinders are cast en bloc with a detachable one-piece head and the cylinder blocks are of chrome nickel. Both models are of the L-head arrangement with exhaust valve seat inserts.

The drive on both models is from a dry single plate clutch through a four-speed selective unit-with-engine transmission, a five-speed transmission in fifth being available at slight extra cost. Final drive is of the single reduction type. The four-wheel foot brakes of both models are of the internal hydraulic type and the brakes on the Model EF are vacuum booster actuated.

Both models have chassis frames of pressed carbon steel with side members 7 15/16 inches deep, 7/32 inch thick and with a 3-inch flange. There are five cross members, three of which are of the box girder type. A feature of the spring suspension on these models is the use of Mack rubber shock insulators at all spring ends, insulating both the body and load against road shocks and eliminating the necessity of lubrication at the spring ends. The lines of these models are streamlined and the cabs are of all metal construction, fitted with safety glass.

Handling materials on a New York highway job at the rate of 227 yards per hour—at a cost of only 1½ cents a yard, 14 hours a day—this LINK-BELT Speed-o-Matic Crawler Crane made an excellent performance and profit record . . . . . .

"No Repairs



LINK-BELT

Speed-o-Matic SHOVEL DRAGLINE - CRANE

New Crawler Hoist "Jack of All Trades"

The new P & H multi-service crawler hoist is described by its manufacturer, the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis., as a "Jack of All Trades." Provided with three hoisting drums, this hoist combines in one machine the high-lifting capacity with drawbar pull and mobility of a tractor from which it is possible to work from either side or over the front end. Three forward travel speeds, ranging from 1.3 mph in low gear to 5.2 mph in high, provides mobility to meet all ground conditions, either climbing steep hills or traveling through soft swampy areas, according to the manufacturer.

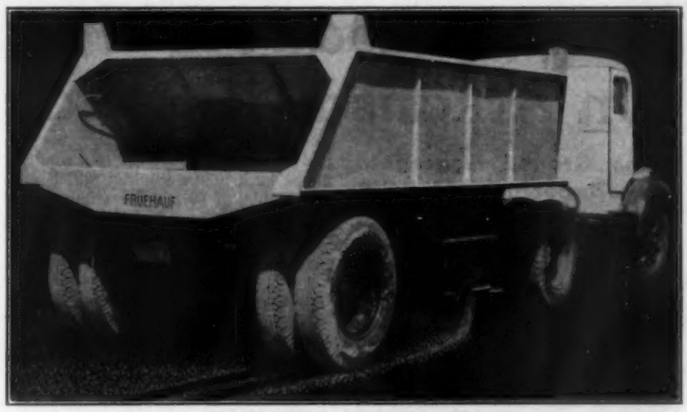
Some of the jobs for which this P & H crawler hoist is designed are pushing a snow-plow or bulldozer, use as a crawler crane or clamshell, pulling rotary scrapers, dump wagons, road graders and similar equipment, pipe handling, backfilling trenches, general utility lifting and hoisting, material handling, earth boring, or as a power drag scraper in open-pit quarries.

A new Bulletin X-39, describing this P & H multi-service crawler hoist which will lift up to 35,000 pounds with the stiffleg, may be secured by interested contractors and state and county highway departments direct from the manufacturer.

New 6-Cylinder Diesel

An addition to its line of industrial diesel engines, Model D4600, has recently been announced by Caterpillar Tractor Co., Peoria, Ill. This new 6-cylinder 66-hp model has a 4¼ x 5½-inch bore and stroke and turns at 1,400 rpm normal governed speed. It is of the four-stroke cycle valve-in-head water-cooled design and features solid injection of fuel into precombustion chambers.

On construction jobs, the new engine will power ¾-yard shovels, draglines and other equipment requiring similar power. In such equipment, at a rated load of 50 horsepower, the engine uses not more than 3 gallons of low-cost fuel an hour, according to the manufacturer.



The New Fruehauf Gravel Spreader

New Gravel Spreader

A new unit for spreading sand, gravel, chips, crushed rock and cinders in road construction and maintenance work has recently been announced by the Fruehauf Trailer Co., 10928 Harper Ave., Detroit, Mich. This new spreader is an 8-cubic yard body, strongly reinforced throughout but light in weight due to the elimination of any mechanical lifting device and the substitution of a special body for the conventional dump body.

This new Fruehauf spreader allows a flow of material from ½ to 7½ inches and the specially designed discharge gate enables the flow to be shut off instantly, without seepage, according to the manufacturer. This discharge gate which can be operated by hand, air or vacuum, and can be controlled from the cab, permitting one-man operation, is located in approximately the center of the body and the material flows directly downward onto the road, without any tilting of the body.

The unit is equipped with 9.00/20 10-ply dual pneumatic tires, Westinghouse air brakes, main and auxiliary springs, supports, I-beam axle and is electrically welded throughout.

Bulk Cement Plants

The complete bulk cement plants, made by the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Penna., include cement storage bins in a complete range of capacities, in both portable and knock-down types, including steel roofs for the bins; cement-weighing batchers in any size required, equipped with either beam scales or springless dial scales; conveying equipment for elevating the cement into the storage bins, with entirely enclosed unloading equipment for receiving cement from hopper-bottom cars, box cars or from trucks; and gasoline or electric power unit and drive for the conveying equipment.

The storage bins, especially designed for the handling of cement, have hopper slopes on a minimum of 60 degrees with the horizontal and the entire bin construction is such as to prevent leakage of cement from the bin and to protect the cement from moisture and weather. A special sealing compound is furnished with all Blaw-Knox cement bins for sealing the joints and seams during erection. In the portable cement bins, the hopper and roof sections are of welded construction. The roof section includes a manhole, air vent and flanged connection, either for the chute from the cement elevator, or the pipe line from a cement pump. These bins are furnished in both circular and rectangular styles, and can be divided into compartments for the storage of more than one kind of cement.

Complete information on the component parts of these Blaw-Knox bulk cement plants is contained in Catalog 1566, a 48-page booklet describing and illustrating the complete line of Blaw-Knox bins and batchers, copies of which may be secured from the manufacturer.

to Date"

Reports the Parlor City Construction Company . .

On peak days of 14 hours, the Parlor City Constr. Co.'s 1½-yd. Speed-o-Matic handled 3178 yards of sand and crushed rock at a concrete-mixing station a day, for a cost of only $0.0145 per yard! Read what one partner has to say:

"On a typical 12½-hour day, when we laid 3000 feet of concrete 10 feet wide, the crane handled 27 cars (65-ton gondolas) of material, 9 of sand, and the equivalent of 9 cars each of mixed 1's and 2's crushed rock, and 3' crushed rock. The sand was brought in by rail, the rock by truck. Fully 80% of all material was handled twice, from the point where dumped to storage pile, from car to storage pile, etc., and from storage piles to the bin 20 feet above the ground.

"These operations involved a total of 2380 yards of material in a 12½-hour working day—an average of 190 yards per hour. On a peak 14-hour day the crane handled 3178 yards of 227 yards per hour.

"The K-45 has cost us nothing so far for repairs!"

Here's What The Operator Says

"The crane arrived from Chicago on a Saturday, was unloaded the following Monday, and went right on the job. I went right to work on it without previous experience on a hydraulic machine. It is easier to operate than the best of the lever machines. After a 14-hour day I was not tired, but after a 10-hour day on a lever machine I'd be worn out. A 14-hour, 3178-yd. day was an easy job. I didn't rush a bit."

Operators of Speed-o-Matic shovels, cranes and draglines can deliver the goods on routine and tough assignments alike—because they're swinging the best of modern equipment—with the tips of their fingers! They can put more headwork and less muscle into completing a job quickly and economically; the responsive, short-throw handles they manipulate give greater speed and accuracy, plus positive control. The result is, operators go their whole shifts with the right "feel" all the way and end up the day fresh and ready for more.

Send for descriptive Book No. 1795, now.

LINK-BELT COMPANY 7615

300 W. Pershing Road, Chicago Distributors and Offices in Principal Cities

Machine Road-Mix On Arkansas Highway

Dense Graded Aggregate With Experimental RC-3 Used on U. S. 167 Contract of Roy Tanner Paving Co.

✦ ARKANSAS has made a success of road-mix highway construction with open graded aggregate in the northern section of the state where crushed stone is available, and the results of the work in the southern area in the last two years with pit-run dense graded aggregate and MC-3 asphalt have also been highly successful. On one of the three contracts awarded to Roy Tanner Paving Co. of Tulsa, Okla., in 1937 in the Fordyce area a project was constructed using RC-3 asphalt for the surface on a 6-inch compacted gravel base primed with MC-1 asphalt and sealed with emulsion.

This Hampton-Calion contract for 8.4 miles of grading, a 20-foot gravel base course and an 18-foot bituminous surface was awarded to Tanner for $44,080.05 and work was started March 31, 1937. The existing base was scarified and shaped with an Adams grader having a 14-foot blade and pulled by a Caterpillar Sixty tractor. Then a 6-inch gravel base was spread 20 feet wide, using 50 cubic yards of gravel per station, crowned 3 inches, rolled with a 7-ton Huber gas roller and allowed to compact under traffic with constant blading when sufficiently damp from rains.

A Lorain 1¼-yard gas shovel widened the backslopes of all the cuts, loading to Fords and Chevrolets, and the material was used to build up the shoulders to the level of the top of the gravel base. The shoulders were dressed by three 3-mule team fresnos.

Gravel Spread on Primed Base

The contractor primed the traffic-compacted gravel base course with MC-1 asphalt having a penetration of 240 at the rate of 0.29 gallon per square yard, using his own Etnyre distributor. The prime applied at a temperature of 150 degrees was allowed to cure for three days with no traffic permitted on the road for the first two days.

The dense graded mineral aggregate, pit-run gravel with the oversize screened out, was then dumped in a windrow along the right-hand side of the road at the rate of 200 pounds per square yard of road surface to be surfaced. The average gradings for the mineral aggregate were:

Retained on a 1¼-inch screen	00 per cent
Retained on a No. 4 screen	50 per cent
Retained on a No. 10 screen	66 per cent
Clay and silt	8 per cent

The windrow was placed at the side for two reasons. First it permitted traffic to use the roadway with greater facility and the final position of the windrow was usually at the right-hand side about 3 feet from the edge where a road-mix machine was used. Second, to air-dry the aggregate to not more than 2 per cent moisture, it was bladed across the road and then to the side again for the Barber-Greene road mixer.

Mixing the Gravel and Asphalt

This was the first job in Arkansas using RC-3 asphalt with the dense graded mineral aggregate. It was applied at a rate of 4 per cent minimum asphalt content by weight, the average for the entire job being 4.45 per cent and the actual variations according to extractions being from 4.2 to 4.82 per cent. The two-unit Barber-Greene road mixer picked up the gravel from the windrow, shot it with the asphalt at a temperature of 140 to 160 degrees, produced a homogeneous mix with the pugmill and delivered the material to a windrow at the back of the machine which traveled at 9½ to 10 feet per minute. The material that was mixed in the morning was bladed across to the left side of the road in a windrow in the afternoon and then the next day was bladed to a windrow on the right side again. Actual spreading of the windrow across the road to a width of 18 feet began about noon. It was found that the element of time in curing was not as important as the area of surface exposed to the air during blading from one side to the other.

It is expected that, as a result of the experience with this project using the RC-3, on future work with the same asphalt the windrow will be moved more than twice across the roadway to increase the surface exposure. The mix as spread was 2½ to 2¾ inches thick which compacted to 2 inches under the rolling with a 7-ton and 5-ton 3-wheel roller. Traffic was permitted on the road during rolling, resulting in a considerable number of grooves or tire marks which did not iron out under the moderate rolling. The reasons for the light weight of the rollers used is that the aggregate is not so hard as the usual gravel employed for road work in the north and east. In fact a number of cases were noted where the gravel had cracked even under the light rolling it had received. The kneading of the traffic after the initial rolling was most effective in compacting the roadway surface. In the future it is planned to keep all traffic off the road until the initial compaction is secured through machine rolling.

C. & E. M. Photo

Surface Texture of Dense Aggregate Road-Mix After 30 Days' Traffic and Before Sealing

The road surface was checked with a straight-edge applied longitudinally. The tolerance from a true plane surface was ¼ inch in one foot and ½ inch in 10 feet under a 10-foot straight-edge.

Sealing

The final seal on this job was with emulsion. The roadway surface was allowed to cure for a period varying from one to five weeks and then sealed with an application of 0.23 gallon per square yard of asphalt emulsion at a temperature of 100 degrees. Immediately after, before the emulsion had a chance

(Continued on page 16)

A Family of "Go-Getters"
Every unit in the ⅜ to 2½-yd. Lorain line has earned its spurs in the service of the nation's leading contractors. While offering a wide range of capacities and boom equipment, this family of shovels and cranes has one advantage in common. All are built to the proven principles of Center Drive design. It is through this exclusive feature that Lorains possess those "go-getting" qualities of power, speed, and strength which they use to wring the last cent of profit out of every job.
The number of successful contractors who look to Lorains for their entire shovel and crane requirements is growing yearly. You, too, can profit by standardizing on Lorains. Write today for catalogs describing the complete ⅜ to 2½-yd. line.
THE THEW SHOVEL COMPANY, LORAIN, OHIO
The Charles F. Meyer Co., Baltimore, Md., uses both a ¾-yd. Lorain-40 and a 1½-yd. Lorain-77 clamshell on the Back River Sewage Disposal Plant Project.
THEW CENTER DRIVE
LORAINS
3/8 TO 2 1/2 CU. YD.

Care of Equipment Saves State Money

(*Continued from page 2*)

kinds, of equipment, and is assigned for service only with those types.

Checking the Lubrication

Three sets of standard lubrication forms have been prepared, No. 697 for 1,000-mile oiling and greasing of automobiles, No. 698 for the 500-mile oiling and greasing of motor trucks, and No. 699 for the oiling and greasing of all other automotive equipment such as tractors, power graders, shovels, air compressors, belt and bucket loaders, pumps, concrete mixers, and other equipment which is usually lubricated in the field by the operators, and not regularly returned to the district garage.

One of these cards is furnished to each piece of motor equipment and they are carried by the equipment at all times, protected so that they do not get damaged and are kept clean. On most equipment some type of holder is provided. The forms are 8 x 5-inch cards of heavy manila board printed in black. There is a place for the official number designating the piece of equipment in the department records, the district to which it is assigned and the month for which the report is made. The official month is from the 16th of one month through the 15th of the following month. The cards are removed from the equipment, checked by the Chief Mechanic and sent to the central office at the end of each fiscal month and new cards issued with all the information needed and including the date and the mileage on the odometer of the machine or the hours worked in the next oiling and greasing period in the case of the equipment other than cars and trucks.

On the face of Form 697 is a list of the different parts to be lubricated and as each of these is greased with the proper lubricant the person responsible for lubricating checks the item and then when all have been completed he signs the card for that periodic lubrication. The equipment then goes back to the shop when the mileage has increased another 1,000 or 500 miles, depending on the type. The items on the automobile card are: crankcase—drain and refill, transmission, differential, universal joints, fan bearing, water pump, distributor, generator, starter, engine controls, air cleaner, clutch release, steering, wheel bearings, brake rigging, king pins and spring shackles, knee action and shock absorbers, and battery checked. On Form 698 there are in addition: transfer case in the case of four-wheel-drive trucks, magneto, and hydraulic control systems; while knee action and shock absorbers are omitted.

The 50-Hour Service Report

Form 699 for the heavier pieces of road building and maintenance equipment has a slightly different list of items to be lubricated. These are essentially the same as the truck reports but also include: track wheel bearings and lifting and regulating parts. The former apply, of course, to tractors and the latter to the lifting devices on graders. In addition, on the reverse of the card for the 50-hour equipment is a column for listing the number of hours the machine has been operated. This serves as a check on the report for the face of the card as the mechanic lubricating the machine has no indicator to check the number of hours the machine has been operated as he has for miles in the case of the odometer on the motor car or truck. Many times this type of equipment, such as graders and stone crushers, works under severe and dusty conditions. In such cases the operator is instructed to grease his unit and clean the air cleaner daily.

The Operator's Daily Check

Remember that the operator makes a report at the end of each day on any trouble that he finds in the machine. At the beginning of each day he is required to make certain checks on the machine to be sure that it is in shape to do a full day's work. The items he looks into are listed on the reverse of Forms 697, 698 and 699 and spaces are provided for him to check them on each of the 31 days of the month by number of the day. These items are: oil level in crankcase and hoist, cooling system, tires properly inflated, lights and reflectors, horn, windshield wipers, defrosters, brakes, equipment clean (more about this later), motor clean, ammeter reading, and oil pressure gage reading. If he finds these all in proper condition the machine is ready for him to take out.

Every piece of equipment starts its first trip from the shop with a good coat of paint and the motor cleaned so that a man will be proud to operate it. Motor trucks and the heavier pieces of equipment in particular get a lot of hard treatment and become dirty very quickly. Every effort is made to see that the machines are washed at frequent intervals between jobs and twice a year during the semi-annual overhauls the machines are repainted.

Although the forms have been in use for about one year and their daily use is strictly enforced on penalty of disciplinary action, it has not yet been necessary to give a man more than one good heart-to-heart talk on the need of daily attention to the use of the forms to impress him of their value and no dismissals, nor even lay-offs, have been necessary to impress drivers and operators of the importance of the reports.

Personnel

Samuel W. Marshall is Chief Engineer of the Pennsylvania Department of Highways. The Equipment Bureau, located at the Central Garage, Harrisburg, is in charge of G. R. Tyler, Equipment Engineer, assisted by Sherwood F. Ritz, Assistant Equipment Engineer and G. S. Dunford, District Mechanic.

1938 A.S.T.M. Annual Meeting

The forty-first annual meeting of the American Society for Testing Materials will be held at Chalfonte-Haddon Hall, Atlantic City, N. J., from June 27 to July 1. Some hundred technical papers will be presented.

HOBART WELDING MAKES MONEY FOR YOU... SAVES IT FOR YOUR CUSTOMERS

Hobart "Simplified" Portable, Gasoline Engine Drive Welder lets you make repairs right on the job—saves loss of time, expensive shutdowns and repair parts bills. Ample power for the heaviest construction work. Will easily pay its own way.

BUILD YOUR OWN portable welder by using special generator coupled to your engine. Save $250 to $500. Ask for details, no obligation.

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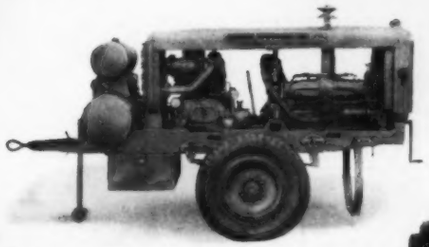
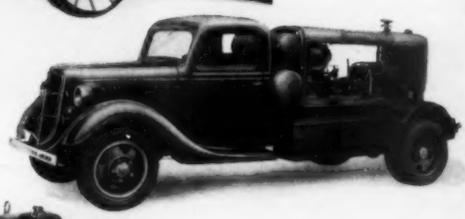
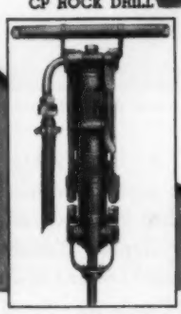




CP BACKFILL TAMPER

CP CLAY DIGGER

CP ROCK DRILL



CP CONCRETE SURFACER

CP SUMP PUMP

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CHICAGO PNEUMATIC

J-1-38

The New Galion Master Grader

New Motor Patrol Grader

The new Master motor patrol grader with gasoline or diesel power, recently announced by the Galion Iron Works & Mfg. Co., Galion, Ohio, has a number of new features, including simplified construction, more powerful lifts, a new and more powerful scarifier, better distribution of weight to provide better blading and scarifying, and a longer wheelbase. The new three-passenger cab with a three-in-line or cloverleaf arrangement is optional with the operator.

Complete information on this new unit may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

Self-Cleaning Ripper

In the Killefer revolving road ripper, the standards are mounted on a heavy shaft which rotates on its four lathe-turned journals in bearings mounted on the frame members which extend from front to rear of the machine. This shaft actually forms a strong cross member across the rear of the frame and is well supported in the center.

The tool-head rolls like a barrel, forward or back. As the standards rotate, they pass between the heavy frame members and trash can not stay between them. At a pull of the single control rope, without stopping or backing the machine, the tool-head revolves. The points leave the ground and roll over obstructions as the machine moves forward. The tool-head will stop automatically, half-way over, with the points above the frame, in which position the machine is ready for transporting. The points roll forward again, at the next pull of the control rope, to resume digging.

The machine is simple in design and easily controlled. All revolutions of the tool-head are controlled entirely by one rope to the tractor seat. All models work to a depth of 14 inches and from 64 to 72 inches in width.

The various models of the Killefer revolving ripper are described and illustrated in a folder which those interested may secure direct from the Killefer Mfg. Corp., 5525 Downey Road, Los Angeles, Calif., by mentioning this magazine.

New Digging and Rehandling Buckets

The HiPower digging type of clamshell bucket, as recently redesigned by the Geo. Haiss Mfg. Co., Inc., 141st St. & Park Ave., New York City, has increased size and strength of the bucket jaw, among other features. For example, on the 1¼-yard size the jaw is 1½ inches thick and 15 inches wide along the bottom edge. The shape of the bucket bowl has been made practically the arc of a circle in order to reduce the friction of the material in the bucket to a minimum. The corner arms, which produce the digging reaction at the jaw of the bucket, have been made straight and rectangular in section and are designed as columns to take the necessary compression. The lower nest of closing sheaves on the center block is in the clear above the block so as to avoid any pockets for gathering and holding material which would otherwise not only add to the friction but also wear the cables excessively. The shape of the center block itself has been made roughly rectangular so that additional counterweight blocks can be bolted to the sides of the center block in order to increase the digging effort if necessary.

The rehandling buckets include the Contractor which uses the power wheel closing mechanism and the Multi-Sheave type which has the same closing mechanism as the HiPower. This bucket has also been redesigned so far as the bowl contour and corner arms are concerned, the bowl contour being made in the circular arc or streamline shape, and the corner arms straight and rectangular in shape and designed as columns.

Copies of Bulletin 237 on the HiPower model and Bulletin 337 on the rehandling buckets may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

RAIL
CRANES
SHOVELS
DRAGLINES
ZEE ROTATORS

BROWNING PRODUCTS

DIESEL
GASOLINE
STEAM
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BROWNING
has had no peer for 40 years

AT YOUR SERVICE FOR THESE PRODUCTS

THE BROWNING CRANE & SHOVEL CO
Established 1899
Main Office and Factory 16226 Waterloo Rd., Cleveland, Ohio
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CRAWLER, TRUCK AND WAGON
SHOVELS
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ANOTHER GOOD ROAD MADE BY
GOOD ENGINEERING AND GOOD PRODUCTS

Socony Monomac, Penetration Method, Standard Brand—Spring Street, Clifton Springs, N Y.

SOCONY Asphalt Road Oils • Socony Asphalt Joint Fillers • Socony Waterproofing Asphalt • Socony Cut-Back Surfacing Asphalt • Socony Asphalt Binder A for surface treatment • Socony Refined Asphalt for sheet asphalt paving • Socony Cold Patch Asphalt for all types of patching • Socony Asphalt Binders B & C for penetration work (Asphalt Macadam) • Socony Paving Asphalt 51-60 and 61-70 Penetration for the mixing method (Asphaltic Concrete) • Socony Asphalt Emulsions • *Specifications and all other particulars furnished on request.*

SOCONY-VACUUM OIL CO.
INCORPORATED
STANDARD OIL OF NEW YORK DIVISION

CUMMER
Asphalt Plants
All styles and sizes
for
HOT or COLD Mix
Heavy-Duty Mixers
45 Years' Experience
Write for literature
THE F. D. CUMMER & SON CO.
17th and Euclid Ave.
Cleveland, Ohio

C. & E. M. Photo

The Pre-Coated Aggregate Laid and Rolled, Ready for the Seal

County Road Paved With Pre-Coat Mix

(*Continued from page 1*)

It was necessary to reshape the road, as well as drag and plane it, for its future service as an 18-foot base. In some parts the road with the shoulders was not even 18 feet wide, but by donations of the needed right-of-way by adjacent land owners the alignment was straightened and for 2 miles the base widened with pit-run gravel to the required 18 feet.

Operation of the Plant

The pre-coat plant was located on a siding in Lawrence at about the middle of the job. The aggregates were furnished by the American Aggregates Co., from Indianapolis, Ind., according to the specifications calling for 95 per cent crushed gravel. A portion of the job was done with crushed stone and that material came from Greencastle, Ind. The emulsion and pre-coat plant were furnished by the Bituminous Materials Co. of Terre Haute, Ind.

The aggregates were delivered in hopper-bottom cars and dumped into a pit from which they were unloaded by a Burch unloader direct to a McConnaughay drier. This new short drier has four Hauck oil burners to furnish the heat and the short stubby form of the drier makes it possible to fit it into close quarters and where the most thorough drying is not necessary.

The aggregates of ¾-inch down to ¼-inch from the drier were lifted by a bucket elevator to the pre-coat machine where an emulsion made by the Bituminous Materials Co., using Texaco asphalt so that it met the specifications of 65 per cent asphalt and a slow break, was sprayed onto the aggregate at the rate of 3 to 5 per cent by weight of the aggregate and the material went through a standard pugmill. The mixed material dropped into the boot of an enclosed elevator with slotted buckets which permitted the excess emulsion and the water from the emulsion where it had broken to drain out into a pit at the bottom. This pit was periodically bailed out with a bucket and the water hauled away.

The elevator with the slotted buckets delivered the partially mixed aggregates to a second pugmill which again mixed them and delivered the load directly to a waiting metal-body truck. The material as loaded into the trucks was still brown, showing that the emulsion had not completely broken, and the aggregates were completely covered as far as the eye could note. The trucks pulling away from the plant had a continual drip from the tail boards, showing the beginning of the breaking of the asphalt emulsion and possibly the loss of some excess asphalt. It was interesting to note the "selective" character of the gravel as the material reached the road. Most of the emulsion had broken when the trucks delivered the mixes to the road but when the material was spread about 10 to 15 per cent of the gravel had completely shed the coating of asphalt emulsion and appeared in the road as uncoated aggregate. This apparent loss of binder was eliminated when the seal was applied as that covered the top of all of the aggregate. This is not the first instance of asphalt failing to stick to aggregate that has been noted on bituminous work visited. On the Sky Line Highway in Virginia the same difficulty

(*Continued on page 24*)

A Trailer for Every Heavy Duty Requirement

ALL TYPES
ANY CAPACITY

Write or Wire

C. R. JAHN CO., Chicago, Ill.
Builders Bldg.

STERLING BALANCED WHEELBARROWS

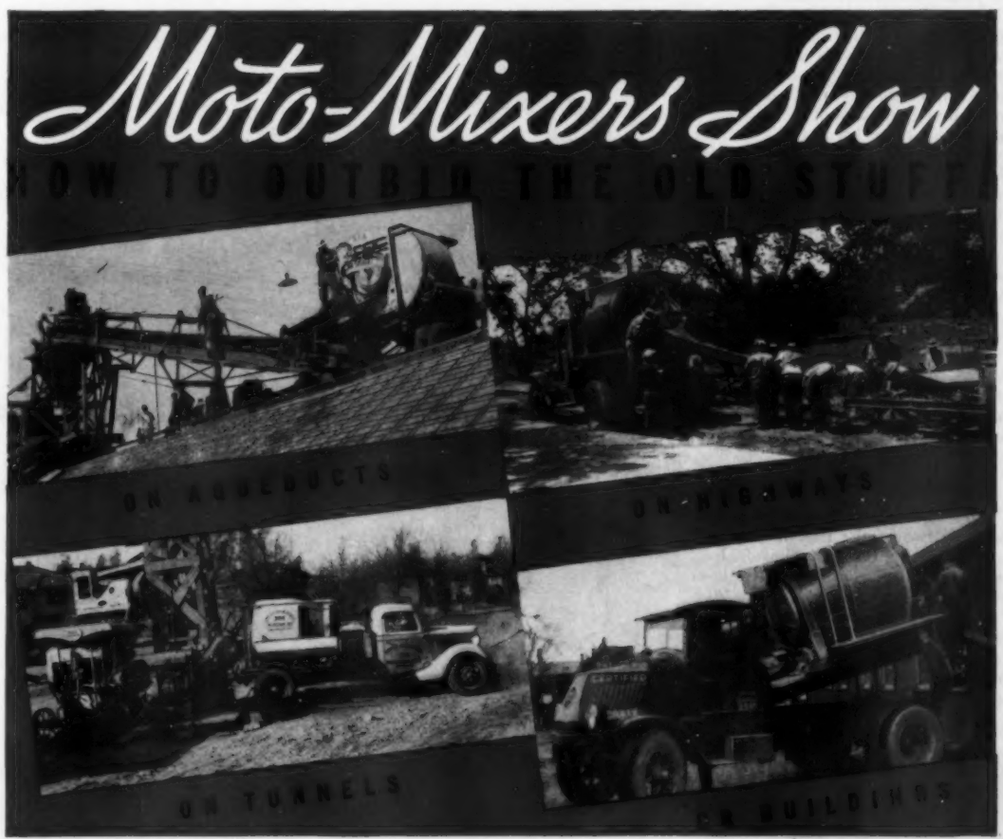
GREATER PART OF LOAD BALANCED OVER WHEEL. LESS THAN 20% ON ARMS.

NO. S-12—FOR DRY MATERIALS

NO. S-18—FOR CONCRETE

A COMPLETE LINE OF STERLING WHEELBARROWS AND CONCRETE CARTS.

STERLING WHEELBARROW CO., MILWAUKEE, WIS.



Are you getting your share of the concrete jobs in your territory?

One look at the list of "Bids Awarded" in your territory shows in most cases that the contractor who gets the job is the one who bases his bid on the cost of doing his job with modern machines and methods.

That's why, before they place their bids, more and more contractors are estimating the savings possible when Rex Moto-Mixers are used for mixing, hauling and placing concrete. Moto-Mixers with their fast, efficient service make it practical to bid on more types of jobs *and to keep the bids low!*

If you want a greater share of the jobs in your territory, investigate Rex Moto-Mixers today! They'll show you how easy it is to outbid the old stuff.

Now GET THIS NEW FREE BOOK!

"Payloads for '38"—shows in black and white the many advantages you gain by turning to Rex Moto-Mixers and Agitators for your concrete mixing, hauling and placing jobs. A copy will be sent you free of charge upon your request. Use handy coupon below.

CHAIN BELT COMPANY
1666 W. Bruce Street, Milwaukee, Wisconsin
Gentlemen: Please send me my copy of "Payloads for '38."
Firm Name_____
By (Title)_____
City_____ State_____

REX
MOTO-MIXERS
CHAIN BELT COMPANY OF MILWAUKEE

The Littleford Expansion Joint Filler and a Littleford No. 84-HD Kettle Filling Longitudinal Joints on a New York State Highway

New Unit for Filling Road Expansion Joints

A novel piece of road equipment which at first glance brings to mind a child's "scooter" has been developed by Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio, for use in filling expansion joints in concrete roads.

This new expansion joint filler consists of a small light chassis with four wheels. The front wheels are on knuckle steering axles controlled by a long curved handle on the front. A vertical handle directly in front of the operator's seat controls the valve in the line from the asphalt kettle outfit to the joint filler head. A foot pedal operates brakes on the rear wheels.

Used in conjunction with an asphalt kettle, this outfit can fill many miles of longitudinal expansion joints in concrete highways easily and uniformly. Adjustments for filling hair-like joints or extremely wide deep openings can be made easily and quickly.

Complete information on this new unit may be secured by interested state and county highway engineers and by contractors direct from the manufacturer.

New Booklets on Shovels

Two new booklets describing and illustrating two of the line of Bay City shovels made by Bay City Shovels, Inc., Bay City, Mich., have recently been issued by that company. Catalog 20-B is a 12-page booklet on the Model 20 heavy-duty ⅜-yard convertible shovel, dragline, clamshell and trench hoe and Catalog 62-B devotes its 8 pages to the Model 62 1-cubic yard convertible shovel, dragline, clamshell or trench hoe, with a rated crane capacity of 17½ tons.

Either or both of these catalogs may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

New Double-Drum Power Control Unit

Designed for ruggedness as well as the efficient operation of cable-controlled heavy grading equipment, the new double-drum power control unit, recently announced by R. G. Le Tourneau, Inc., Peoria, Ill., and Stockton, Calif., incorporates a number of improvements over previous models.

This unit, designated as Model R8 and designed for use on Caterpillar D8 tractors, has a lower gear reduction ratio, thus reducing line speed and increasing line pull, with an empty drum, to 5,000 pounds as compared to 4,000 pounds of the previous unit. The use range is also increased by a cable capacity of 225 feet of ½-inch 6x19 cable on each drum. To insure quicker and more positive braking, the area of the brake has been increased 40 per cent and an improved braking mechanism permits the application of more pressure per square inch to the drum. A greater safety factor is thus established in operations depending on positive braking.

Cooler operation is also claimed for this new model, due to the greater braking area and to a decrease of the intraconduction of heat because of an insulating air space between the enlarged brake drum and the clutch. The main casing has been strengthened to take more abuse without throwing strains on the enclosed working parts.

GRIFFIN
WELLPOINT SYSTEMS
33⅓% more efficient

The ONLY wellpoint with water inflow through entire screen circumference.

WHY?—Because no solid rods or flutes are used as separators!

Write for new catalog. "Pointed Wellpoint Facts"

GRIFFIN WELLPOINT CORP.
725 East 140th St., New York
Phone: MElrose 5-7704-5

BUYING A HOIST?

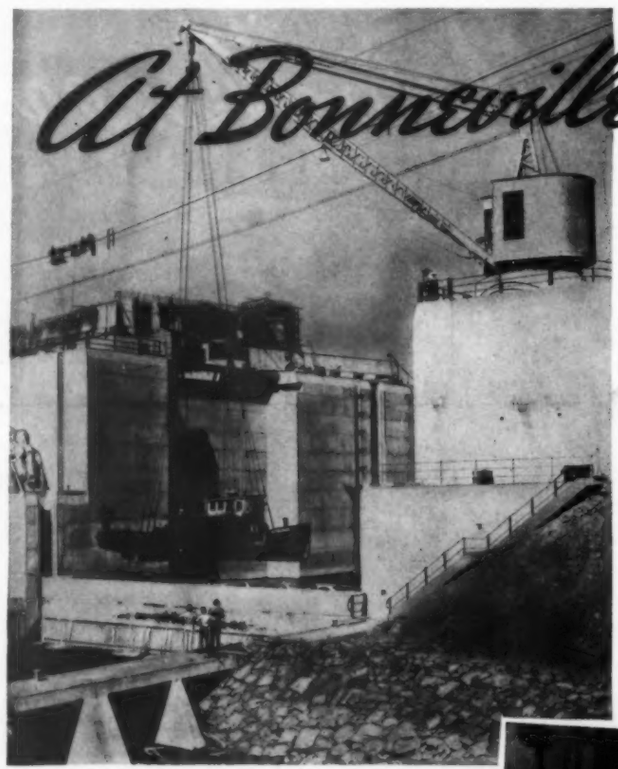
JAEGER Ball Bearing HOISTS up to 100 H.P. Offer . . .

- Finger-Tip Hoist Control (same as on $12,000 Shovels)
- Finest Double-Row, Self-Aligning Bearings,
- Machined, Balanced Drums
- Silent Chain Drive, Compounding Brakes, etc. 1, 2 or 3 drums (interchangeable), Gas or Electric.

Get our low prices on light 10-20 H. P. and intermediate 25 H. P. Screw Thrust Hoists. Send for Catalog H-37.

THE JAEGER MACHINE CO.
701 Dublin Ave. Columbus, Ohio

JAEGER



Crane lifting towboat over temporary bulkhead pending completion of lock which will handle ocean-going vessels.

BONNEVILLE, $52,000,000 development on the Columbia River, called into use equipment of extraordinary size and capacity . . . equipment raising new lubricating problems.

In solving these problems, a number of contractors used Texaco Lubricants. Among them were:

SAM ORINO COMPANY
(Texaco Marfak, Texaco Thuban, Havoline Motor Oil, Texaco Rock Drill Oil, Texaco Crater, Texaco Sultex Cutting Oil, New Texaco Motor Oil.)

D. A. WHITLEY
(Texaco Marfak, Texaco Thuban.)

Trained lubrication engineers are available for consultation on the selection and application of Texaco Industrial Lubricants. Prompt deliveries assured through 2108 warehouse plants throughout the United States. The Texas Company, 135 East 42nd Street, New York City.

Each of the 18 spillways has a pair of these 200-ton control gates. As the result of many tests U. S. Engineers specified Texaco Starfak Grease for lubrication of the Timken-equipped rollers.

View of power house which will have, ultimately, a capacity of 430,000 kw.

TEXACO

INDUSTRIAL LUBRICANTS

Surpassing even the monster Macks at Boulder and San Gabriel, this unit at Bonneville hauls a 35-yard LeTourneau buggy . . . 61 tons, loaded 6 tons at a time by the world's largest dragline. Texaco Marfak is just the thing for chassis and wheel-bearing lubrication under such heavy loads. It outlasts other lubricants 2 to 1.

Equipment Distributor Issues New Publication

The first edition of "The Orange Peel," a house organ devoted to news of the construction industry, was recently issued by the Equipment Corporation of America. To be published every now and then, "The Orange Peel" will contain news and general information of interest to contractors and engineers.

Copies may be received regularly by readers of this magazine by notifying the Equipment Corporation of America, 1150 So. Washtenaw Ave., Chicago, Ill.; P. O. Box 933, Pittsburgh, Pa.; or P. O. Box 5471, Kingsessing Station, Philadelphia, Pa.

Soil Stabilization Booklet

"Soil Stabilization with Tarvia" is the title of a new booklet published by the Barrett Co., 40 Rector St., New York City, containing the latest available information on the use of tar as a stabilizing agent. The booklet is well illustrated, with photographs showing the equipment and various stages of soil stabilization work.

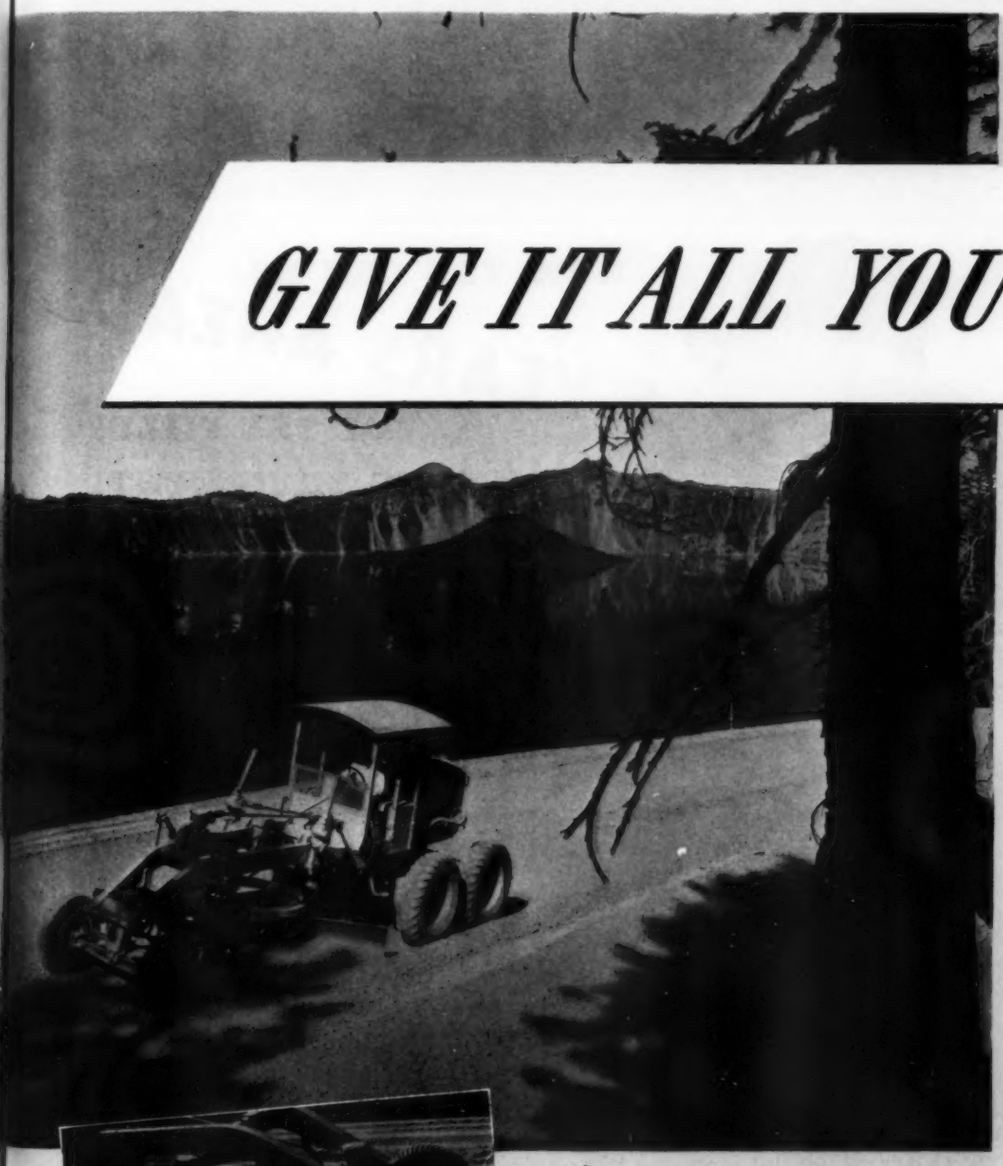
Copies of this booklet may be secured by interested contractors and state and county highway engineers direct from the Barrett Co.

Control of Soil Erosion By New Method Announced

The problem of controlling soil erosion is one which has engaged the thought of Federal, state and county engineers in recent years. A new method of control is described in a recently published pamphlet of the Bemis Bro. Bag Co., 601 So. Fourth St., St. Louis, Mo.

This Lenonet soil fixation material is an open-mesh fabric made of spun rot-resisting paper which, when placed in fields, terraces or on embankments subject to erosion, holds seeds and water in check but at the same time is sufficiently open in character to permit grasses to grow freely. The manufacturer claims that this material induces the same process which nature has used to conserve soil for centuries. Lenonet comes in rolls of fabric 45 inches wide and 800 yards long, rolled on wooden cores.

Copies of this pamphlet, "A New Improved Method of Soil Erosion Control" may be secured by interested engineers direct from the manufacturer by mentioning this magazine.



GIVE IT ALL YOU'VE GOT!

A No. 11 "Caterpillar" Diesel Auto Patrol on the south side of the Rim Drive in Crater Lake National Park. At a 7000-foot elevation this machine works 8 hours a day spreading gravel on a surfacing job — using only 1½ gallons of 10c fuel per hour!

This close-up of a ditching operation shows the blade-clearance behind the front wheel of the "Caterpillar" Diesel Auto Patrol.

A "Caterpillar" Diesel Auto Patrol is *not* a single-purpose machine . . . *but one that does the work of several pieces of equipment.* In other words, an Auto Patrol saves you from buying, maintaining and operating a number of specialized tools. You can give it practically *all* the road jobs you've got!

Do you need a machine to handle oil-mix? The Auto Patrol will do it — just as efficiently and economically as it removes heavy snowdrifts from city streets or country roads!

How about shoulders or ditches to make or put in shape along concrete or dirt? That's *another* Auto Patrol job! So is scarifying . . . blading . . . grading . . . and many steps in building as well as maintaining roads!

Naturally enough, there are reasons why the Auto Patrol doesn't have to stand around idle a good part of the time . . . why it can do many different jobs; do every season's work, as the seasons come and go.

For one thing, it has the traction to utilize its power because its engine-weight is directly over the driving-wheels. Then, consider its distinctive blade-curvature . . . and the fact that neither the engine nor the front wheels limit the blade's working-positions!

Those are some of the features in the "Caterpillar" Diesel Auto Patrol that you'll be quick to see and appreciate — along with its fuel-economy (only about 1½ gallons per hour); its rugged frame and sturdy engine that keep down repairs; its time-saving speed as it goes from job to job at 10 miles an hour!

CAN YOUR MOTOR-GRADER DO THIS?

Here's a ditching demonstration that proves the value of certain Auto Patrol features which no other motor-grader possesses! The first picture shows the cutting of a flat-bottom ditch. This is possible, because the heel of the Auto Patrol's blade has sufficient wheel-clearance to let it be turned under the machine! . . . The second picture shows the back-sloping — with the blade tucked far inside the line of the wheels. . . . The third shows finishing the inside slope — to perfection!

CATERPILLAR

TRACTOR CO., PEORIA, ILL.

DIESEL ENGINES • TRACK-TYPE TRACTORS
ROAD MACHINERY

The New Model A-33 Engine

One-Cylinder Engines

Two new models of single-cylinder engines, one water-cooled and the other air-cooled, were recently announced by the Novo Engine Co., 216 Porter St., Lansing, Mich. These Models C-33 and A-33, respectively, with 4 to 5 hp, are identical as to bore and stroke, mounting dimensions, flywheel housing and shaft dimensions, with 90 per cent of the parts interchangeable. Both have a 3¼ x 4 bore and stroke, displacements of 33 cubic inches and are equipped with a standard S. A. E. No. 5 flywheel housing.

The features of these new engines, which include small mounting dimensions, compact design, accessibility and anti-friction bearings throughout, are described in Bulletins No. 35 and 36.

Two-Speed Truck Axle Gives Dual Performance

The Eaton Ruckstell 2-speed axle, made by the Eaton Mfg. Co., 739 E. 140th St., Cleveland, Ohio, is designed to increase the power and performance of motor trucks. The high ratio gives overdrive performance, enabling a truck to maintain any given road speed at a reduced engine rpm, according to the manufacturer, or to travel faster and farther than normally on a specified number of engine revolutions. The low ratio gives underdrive performance, providing extra power to make better time on difficult grades, to maintain normal speeds without shifting to lower transmission gears, and to pull loads out of mud, sand, or deep pits without bucking or frogging. The shift from overdrive to underdrive is made at any speed by moving a convenient lever.

This 2-speed axle consists of a shifting yoke, actuated by a lever in the cab, which engages and disengages the planetary gearing; an extra large, rugged pinion with a short integral shaft held in alignment by a straddle mounting between anti-friction bearings; a rigid all-steel electrically welded housing; differential gears and axle shafts of increased size; a heavy ring gear to resist distortion under severe torque stresses; and the silent planetary gearing, with sun gear and four sturdy planet gears of the spur type, mounted in a heavy precision machined case.

Complete information on the Eaton Ruckstell axle, as well as performance records under various operating conditions, is contained in literature which may be secured direct from the manufacturer by mentioning this magazine.

New Concrete Admixture

Concretdense, a new admixture for use in a concrete mix to provide high-early-strength concrete, for waterproofing or making the concrete acid-resistant, and for cold weather concreting, is described in a new 4-page folder recently issued by the Flexrock Co., 800 No. Delaware Ave., Philadelphia, Pa.

Copies of this folder may be secured by interested contractors and engineers direct from the manufacturer by mentioning this magazine.

Powdered Asphalt For Low-Cost Roads

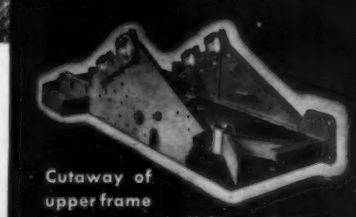
Lincoln-ite, a product of the Ohio Oil Co., Inc., Findlay, Ohio, is an asphalt in powdered form which is produced from crude oil by the reduction of asphalt under vacuum which removes the oils and waxes. This dry concentrated asphalt is ground into a fine powder to facilitate the fluxing when mixed with liquid asphalts and is shipped in 100-pound waterproof bags.

When fluxed with liquid bituminous materials, Lincoln-ite changes the liquid asphalt into a semi-solid asphalt which proves an excellent binder. It is added to various bituminous materials to increase the quantity of hard asphalt in the binder and produce a material with better cementing properties and weather resistance.

When the Lincoln-ite and bituminous material are mixed with fine graded aggregates, a durable and lasting road mat results, which has been used on thousands of miles of highway for low-cost surfaces.

Complete information on Lincoln-ite and its use for low-cost road construction and resurfacing may be secured by interested state and county highway engineers direct from the producer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

PATENTED
MECHANICAL
MIXER TIMELOCK
OPERATES OFF THE MIXER SHAFT—CAN BE INSTALLED ON ANY ASPHALT PLANT. APPROVED BY STATE HIGHWAY DEPARTMENTS.


Cutaway of upper frame showing sturdy X-frame design.

We needn't tell you that excavating jobs usually go to the lowest bidder; nor that it's a real advantage to own the fast, modern equipment that cuts dirt-moving cost to the bone. But we should remind you that P&H began more than five years ago to build excavators entirely of rolled alloy steels—all welded. Others are just beginning. An inspection of these new Pacemakers will quickly convince you that their owners are "five years ahead of the field." Harnischfeger Corporation, 4419 W. National Avenue, Milwaukee, Wisconsin.

17 DIFFERENT MODELS from 3/8 to 5 cu. yds. capacity. Gas, Diesel or electric power. Write for literature on the size that interests you.

HARNISCHFEGER CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

Program to Conserve U. S. Water Resources

A 6-year construction and investigation program for the utilization and conservation of the nation's water resources and a unified policy of water control and development are recommended in the report of the National Resources Committee. The report, requested by President Roosevelt and prepared by the Water Resources Committee of the National Resources Committee, is a revision and extension of the program for the country as a whole recommended by the Committee in 1937. It outlines the principal problems of water control and use in seventeen districts into which the various drainage basins of the country are grouped.

The report includes lists of primarily Federal projects for a six-year period with a total cost of $891,091,000, approximately the same average annual expenditure for projects of these types as during the past six years. The recommended program for non-Federal projects, such as water supply and sewerage and pollution abatement, involves the expenditure of approximately $560,000,000 for water supply and $660,000,000 for sewerage and pollution abatement.

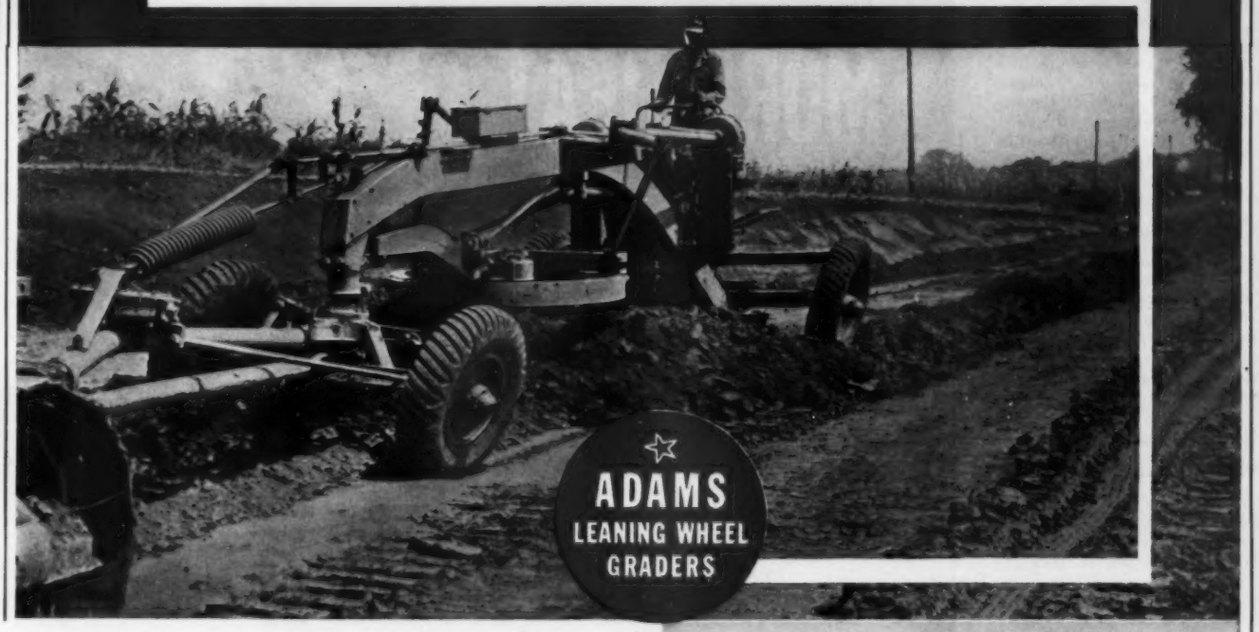
A summary of the cost of the recommended program for primarily Federal construction and investigation includes $81,226,000 for a 2-year flood control program on the Ohio and Lower Mississippi, $75,061,000 for two more years of the TVA program; $184,629,000 to be spent over six years for a general flood control program, $291,539,000 for irrigation, $3,650,000 for water power, $180,575,000 for river and harbor work, and $14,399,000 for beach erosion control.

No-Thread Pipe Fittings

Dresser Style 65 No-Thread pipe fittings, which are self-contained pipe joints connecting pipe without threading, are described in a new 16-page booklet, Form 381A, recently published by the S. R. Dresser Mfg. Co., Bradford, Pa.

Complete details on how these No-Thread fittings make a connection not only easy to install but which is also a permanently tight flexible joint are contained in this booklet, copies of which may be secured from the manufacturer.

3 STAR PERFORMERS
ON CONSTRUCTION WORK



WHEREVER there are roads to build, or there is dirt to move, these Adams units find favor among highway officials and contractors who count their dollars.

Under conditions which favor their use, Adams Elevating Graders still provide the cheapest known method of moving dirt. Exclusive features enable these machines to move big yardage at a remarkably low cost. Available in two sizes.

Adams Hauling Scrapers have several operating advantages which owners say cause them to load and dump easier and quicker than other scrapers. Furnished in 5, 6, 8, 10, and 12-yd. sizes.

In building or finishing grades, including high bank cutting, Adams Leaning Wheel Graders have several time and money-saving operating advantages which you should know about. These machines are available in 8, 10, and 12-ft. sizes.

If you have a dirt moving problem, see your local Adams representative, or write

J. D. ADAMS COMPANY
INDIANAPOLIS, INDIANA

Branches, Representatives and Distributors throughout U.S.

BE UP TO DATE IN '38 WITH ADAMS

Experimental Work On Ark. Road Mix

(*Continued from page 8*)

to break, 15 pounds of "chips" was dumped from the tail-gate of a truck and broomed over the surface with a multiple brush drag broom 18 feet long and 9 feet wide, and rolled with the 7-ton roller to key the material to the surface. The grading of the fines used for the seal is:

Retained on a ⅜-inch screen	0 to 5 per cent
Retained on a No. 8 screen	85 to 100 per cent
Retained on a No. 14 screen	97 to 100 per cent

Major Quantities

The major quantities on this contract with the unit prices were:

Item	Quantity	Unit Price
Common excavation	17,829 cubic yards	...0.25
Reconstruction of base course	101,525 square yards	...0.03
Gravel base course	22,286 cubic yards	...0.60
Prime coat applied	28,229 gallons	.....0.07
Class 21 mineral aggregate	936 tons	.....1.50
Emulsified asphalt	18,720 gallons	.....0.08
Mineral aggregate wearing course	6,686 cubic yards	...1.00
Bituminous material	140,402 gallons	.....0.07
Total bid for contract		$44,080.05

This project was let originally as an MC-3 asphalt job but the contractor proposed at his own expense to change the asphalt to the RC-3 and the Arkansas Highway Department agreed to the revision. The additional cost to the contractor was about ½ cent per gallon for the RC-3 but he figured that the additional speed in curing would offset this additional material cost.

Personnel

This 8.4-mile paving contract was completed by the Roy Tanner Paving Co., of Tulsa, Okla., under the personal direction of Roy Tanner. For the Arkansas Highway Department, LeRoy Head was Resident Engineer and F. B. Sarles, Area Construction Engineer.

New Stabilizer Plant Mixes Road Materials

The new Pioneer No. 73 stabilizer plant, recently announced by the Pioneer Engineering Works, 1515 Central Ave., Minneapolis, Minn., is designed for operating out of stockpiles, mixing aggregate, clay, water and calcium chloride or salt. The plant, which is complete on one truck, is equipped with two receiving hoppers, one for the gravel or aggregate and the other for the clay. A mechanical feeder under the receiving hopper feeds a uniform amount to the gravel conveyor and into the pugmill.

A screw-type feeder under the clay hopper measures the correct amount of clay onto the clay conveyor which takes the clay through the clay shredder and into the pugmill. A hopper and feeder measures the calcium chloride or salt and feeds it onto the clay conveyor.

A Pioneer No. 73 Stabilizer Plant Owned by the West Michigan Construction Co.

Water is pumped from a storage tank alongside of the plant and is sprayed onto the material in the pugmill.

The folding delivery conveyor, shown on the right in the illustration, delivers the finished product to trucks which carry it to the grade for spreading, rolling and compacting to provide a firm dustless stabilized road.

New Compressor Bulletin Describes Improved Valves

The revised edition of its bulletin on Sullivan single-stage horizontal compressors, recently issued by the Sullivan Machinery Co., Michigan City, Ind., includes illustrations and a description of the improved Dual-Cushion valve now being used on these units.

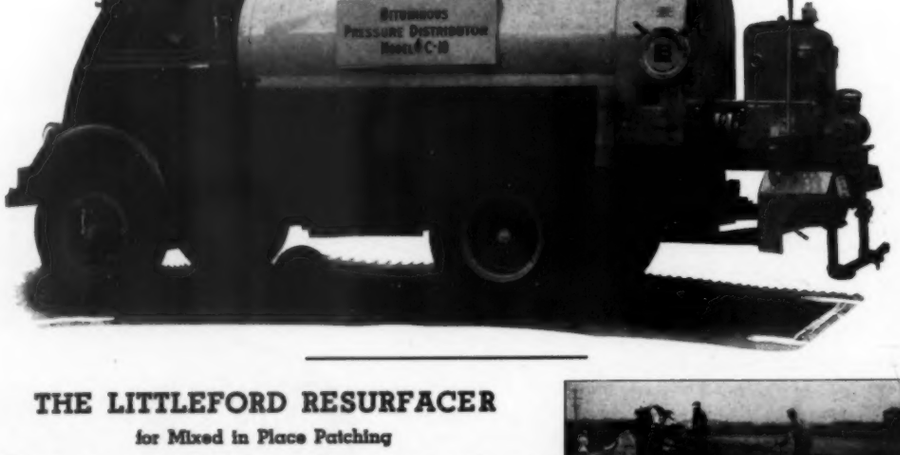
The WG-7 compressors, built for heavy duty, are of the single-cylinder double-acting type with Timken double-row main bearings, replaceable cylinder liners and force-feed lubrication, and range in size from 40 to 125 hp with pressures from 10 to 125 pounds.

Copies of this Bulletin A-12-A may be secured by interested contractors and engineers direct from the manufacturer.

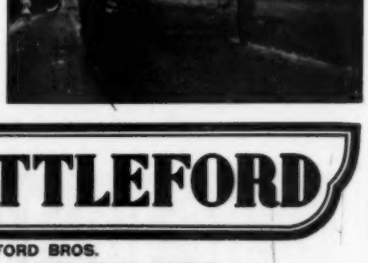
PILE HAMMERS and EXTRACTORS
HOISTS—DERRICKS
WHIRLERS
•
Special Equipment
Movable Bridge Machinery
•
Write for descriptive catalogs.
McKIERNAN-TERRY CORP.
19 Park Row, New York
Distributors in Principal Cities

MORE HEAT
LESS FUEL

Littleford Pressure Distributors have the most efficient heating system of any distributor on the market today. This system consists of one Littleford Low Pressure Burner and a continuous heat flue. This one burner produces more uniform heat than two ordinary conventional torch burners and it burns low cost fuel oil. The Littleford Low Pressure Burner produces a steady stream of hot gases (not flames) that pass through the continuous heat flue (shown above). Entering the center flue at the bottom of the tank, the gases travel the full length of the tank, then branch off into two sections, each section having three more continuous passes the full length of the tank before exhausting in the heat chamber. A total of seven big heat flues heat the tank. Littleford Pressure Distributors as shown below are designed and tested for efficient low cost operation. Write for further details.



THE LITTLEFORD RESURFACER
for Mixed in Place Patching



The Littleford Bituminous Resurfacer is designed to cut the cost of road repairs and to assure a more uniform riding surface. For Mixed in Place Patching, it works like this—apply the material 25 feet ahead of the patching section and stop the material 25 feet short of the end of the patch—this gives the Drag time to thoroughly mix the beginning of the patch and time to empty at the end of the patch. The Resurfacer eliminates segregation, old highs and lows in the road—makes a smooth uniform surface ready for the roller. The Littleford Bituminous Resurfacer can be adjusted from 7' to 12' in width.

Write for further details.

BLACK TOP ROAD MAINTENANCE EQUIPMENT — LB — SINCE - 1900

LITTLEFORD

LITTLEFORD BROS.
485 EAST PEARL STREET
CINCINNATI, OHIO

Plans to Rebuild Coastal Highway

Coastal Highway District Starts $6,000,000 Program In Georgia on U. S. 17 From Savannah to Florida Line

✦ THE Coastal Highway District, composed of the counties between Savannah, Georgia, and the Florida line, Chatham, Bryan, Liberty, McIntosh, Glynn and Camden, built the original U.S. Route 17 as a short line from Savannah through the coastal counties to Florida. The counties put in $900,000 and the contribution of the state of Georgia and Federal Aid amounted to $2,700,000. The state is in process of repaying the $900,000 to the counties under state legislation for refunding county aid on state highway improvements.

Traffic on the Coastal Highway has now reached a daily average of some 6,200 vehicles with a maximum of 10,200. Traffic authorities agree that traffic beyond 4,000 vehicles a day calls for the construction of a divided highway with a medial strip. It is the plan of the Coastal Highway Commission to secure a $6,000,000 bond issue to reconstruct completely these 126 miles of highway with two lanes on either side of the center strip. The counties propose to pay the interest on the bonds while the state of Georgia will pay the principal over a period of 12 years. The program should be completed in about 4 years.

The proposal was favorably considered at the annual meeting of the Coastal Highway District on April 15, 1938, and, after consultation with the State Highway Board, action will be started in the state legislature for an amendment to the state constitution which will be voted on in 1940. In the meantime surveys will be commenced for the proposed four-lane construction.

Advantages of Plan

The State Highway Board of Georgia, with the demands upon it for work throughout the state, is not in a position to allot funds for the prompt completion of such a program but it is estimated that the State Highway Board could contribute approximately $500,000 a year for the improvement of the Coastal Highway. If this were spent from year to year, it would result in piecemeal improvements that would be difficult to integrate into a consistent widening program, so that at the end of 12 years the $6,000,000 would probably fail to provide a four-lane divided highway. With the constant inconvenience of detours during that period and the inadequacy of the road, a good portion of the traffic would in all probability be forced to use other routes.

The solution of the problem, first suggested by C. B. Jones, Chairman of the Board of Commissioners of Roads and Revenue of Liberty County, is a bond issue for the prompt completion of such a widening program. The actual construction program could be completed in approximately 4 years, involving an expenditure of approximately $1,500,000 a year. With such a program, well-integrated plans could be prepared for the entire length of the Highway and satisfactory means for handling traffic provided.

The State Highway Board could retire the $6,000,000 principal at the rate of $500,000 a year, which it is estimated would be spent in any case on improvements of the Coastal Highway, and it would remain for the Coastal Highway District to finance the interest charges which for the 12-year period are estimated to be $1,200,000 or an average of $100,000 a year.

In addition it would be necessary to issue bonds to the amount of $300,000 for purchasing rights-of-way, moving structures and for administrative costs. The principal and interest would be handled by the Coastal Highway District. Based on 4 per cent bonds retired serially over a period of 20 years, the total interest charges would be $126,000. The total cost to the Coastal Highway District would, therefore, be $1,626,000 and the total cost to the State Highway Board, $6,000,000.

This plan can meet with very little real objection from competing routes as it involves no additional expenditure on the part of the State Highway Board, the Coastal Highway District taking care of the carrying charges involved by anticipating the State Highway Department's normal expenditures through the 12-year period.

A further important factor in favor of the prompt widening of the Coastal Highway is the proposed improvement of the road from Augusta to Savannah to be known as the Oglethorpe National Parkway Trail, which it is anticipated will be constructed with Federal funds by the National Park Service. On the completion of this road, a large amount of traffic will be diverted into Savannah with the completion of Burton's Ferry Bridge across the Savannah River near

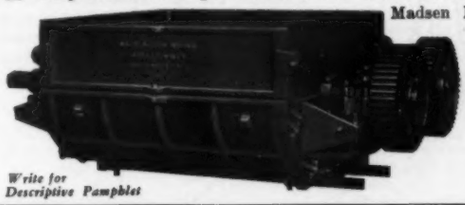
(*Continued on page 27*)

MADSEN

PUG MILL MIXERS

Meet Today's Demands for *Speed* and *Durability*

1. A Madsen Mixer drops its batch in four or five seconds less time than competitive mixers. These four-second savings can mean *an additional 36 batches every eight-hour day.*
2. Simple construction plus the use of the best abrasion-resistant irons enable Madsen Mixers to stand the heavy working strains of hard, sharp aggregates.



Write for Descriptive Pamphlet

MADSEN IRON WORKS
Manufacturers
Huntington Park, Calif.

SAVE with the ECONOMY of INTERNATIONAL POWER

Two International TD-40 Diesel TracTracTors owned by William F. Rodgers, general contractor of Little Rock, Ark., working on an overpass job at Benton, La.

When costs pinch profits, look to your *power* and your *power work methods.* Many men have swept away serious handicaps by scrapping obsolete equipment and methods and re-equipping with International Power. If you say the word, an International Harvester representative will go over your power needs with you and make recommendations that can easily save you many dollars. International dealers and branches have had a great deal of experience with heavy-duty equipment. They know the service needs of machines that do the world's hard work and are equipped to back up every sale to the user's complete satisfaction. If you have a power problem, put your trust in International Harvester.

An International TD-40 Diesel TracTracTor owned by the City of Signal Hill, Calif., shown as it was ripping up a half-mile of hard oil top road. It also disked, and with a scraper it rolled over top dirt mixed with oil and respread it. This job was done in about three and a half days.

INTERNATIONAL HARVESTER COMPANY
(Incorporated)
180 North Michigan Avenue Chicago, Illinois

INTERNATIONAL Industrial Power

C. & E. M. Photo

The Gang Mold for the Riprap Blocks

Novel Form Work For Small Bridge

(Continued from page 1)

sheets of galvanized iron and carry a 14 x 10-inch cap which is also covered with a sheet of galvanized iron. A ⅜ x 2½-inch x 1-foot 7-inch strap is bolted on one side of each outside pile connecting the cap and the pile. The stringers, four per span, are 20-inch I-beams and carry the 8-inch concrete floor slab, with a 1¾-inch crown at the center and drained by two 3-inch pipes on each side in each span. The roadway slab and hand rail are cantilevered 2 feet horizontally on each side with a 1-foot batter, giving a total of 3 feet of overhang.

The concrete abutments are carried on six piles with a concrete cap 2 feet wide, 1 foot 6 inches high and 37 feet long. The paving bracket for the 24-foot roadway is 27 feet 6 inches wide. The concrete cap is 18 inches high and then has a 12-inch offset on the outside and a 4-inch offset on the inside, leaving an 8-inch wall 8 inches high with a 45-degree batter out, measuring 6 inches high and the same width which with the additional 6-inch vertical height makes the bracket for the roadway support. The upper notch is 10¾ inches high.

The concrete curb and hub guard were poured integral with an unusual form. The curb is 9 inches high with a 1-inch batter and is 7 inches wide with a ½-inch batter. The hub guard on top of this is 9½ inches high with a 1-inch batter. The hub guard forms the bottom rail of the hand rail.

Forms for Curb and Hub Guard

Heavy though portable sections of curb and hub guard form were built up and used repeatedly by the contractor. They consisted, as shown in the illustration on page 36, of a heavy notched 2 x 12 carrying the face of the form for the curb and the hub guard at the proper elevations and held rigid by a series of 1 x 4 planks nailed securely together with the wide sides together, thus presenting a heavy face for the 3-ply Masonite and making the forms quite warp-proof. Both the faces for the curb and the hub guard were constructed in a similar manner and the whole supported vertically by 2 x 4 diagonals and a 2 x 4 base with a 2 x 8 plank at the outer end on which cement bags were piled for rigidity during pouring.

A small portable saw table powered with a Wisconsin motor was used for cutting the form material quickly and accurately.

Concreting

Aggregate for the bridge concrete was stockpiled on wooden platforms at the end of the bridge nearer to the work in progress. When mixing started in the LeRoi-powered 10-S mixer, two men started wheeling sand and gravel in wheelbarrows, each load being weighed on the Fairbanks wheelbarrow scale and carried to the mixer. There were two men wheeling and two men shoveling the aggregates, one weigh man, one cement man, the mixer man, two men wheeling out the full rubber-tired Jaeger concrete carts, four spaders, two skilled finishers and from four to six rubbers.

The concrete for slab and curb was Class B consisting of 577 pounds of gravel, 374 pounds of sand not including moisture corrections, and 2 bags of cement per batch. The hand-rail concrete, Class A, was composed of 539 pounds of gravel and 349 pounds of sand not including moisture corrections with 2 bags of cement per batch. Twelve gallons of water was used in Class B concrete and 11.5 gallons in Class A concrete. The concrete was kept as dry as consistent with good placing. Lone Star cement was used, furnished by the Alabama Portland Cement Co., of Birmingham, Ala. Water for the concrete as well as for the curing was furnished from the bayou by a pump delivering to a welded water tank mounted on an old Ford chassis.

Curing of the hand rail was with wet burlap and the slab was covered with 3 inches of sand kept wet for 21 days.

Details of Hand Rail

A ¾-inch expansion joint was placed over every bent so that every hand-rail post was divided. The posts consisted of a pair of 10-inch thick slabs measuring 24 inches across the two and including the expansion joint. The hand rail was 8 x 7 inches with the top rounded to a 10-inch radius and with 1½-inch rounded corners. For each span there was an intermediate post measuring 6 x 16 inches with 2-inch haunches at the top. The posts and hand rail were cast integral with a single form.

Casting Concrete Riprap Block

For the protection of the earth embankment around the ends of the two abutments, the contractor was required to place concrete riprap. He cast this on the job, using well-conceived gang molds so that twelve blocks could be cast at a time. The individual blocks were 12 x 24 x 8 inches and without reinforcement. One batch from the mixer poured six blocks.

The molds were made with ¾ x 6-inch ship-lap lumber on the outside and with 3-ply Masonite partitions between each block. The center of the form was made with a 2 x 4 top and bottom with the inner ¾ x 6-inch lumber nailed to them. At each partition on the outside a 2 x 4 stud held the form rigid. A 2 x 4 run along the outside of the form on the long

PUT THIS ALLIS-CHALMERS LEANING

New, all-welded, twist-proof tubular-frame . . . scientifically designed to absorb the strains, stresses and shocks of grader operation . . . strong enough to hold the pull of any tractor. Leaning frame and long, shiftable rear axle provide greater working stability and permit a wider range of working positions than has ever before been possible in a grader. With the leaning frame you can shift the center of gravity, thus work on steep banks where other graders cannot even stick . . . when necessary you can lean the frame toward that end of the moldboard which needs extra pressure for shearing off roots or cutting through hard spots . . . in cutting flat slopes when crank and lift links have reached their effective limit the frame lean can be used to obtain an additional 25 degrees of moldboard rotation and extra, downward pressure for cutting. Operators say this new Leaning Frame Grader is the easiest operating grader they've ever handled. Put it to work on your grading jobs . . . watch it speed your operations and cut your costs. Now available in two power-controlled sizes—No. 110 with 10-foot blade—No. 112 with 12-foot blade.

Cutting a 1:1 bank. Frame lean enables operator to control grader's weight and so work on banks where ordinary graders cannot travel. Note that even on this steep slope a portion of the operating platform is level, enabling operator to handle controls in comfort.

Shoulder Finishing. Once blade is set to specified cross section, a uniform slope is assured by simply keeping the platform level through use of frame lean control. When speedy adjustment is necessary to clear culverts or other obstructions, lift arm and frame lean may be operated simultaneously.

SEE YOUR ALLIS-CHALMERS DEALER FOR MORE COMPLETE DETAILS!

Normal ditch cut. A level operating platform is possible in this position only with the leaning frame. If extremely hard digging is encountered, tremendous extra, downward pressure can be exerted on forward end of blade by leaning the frame to the right. You move only one control lever to accomplish this and, once hard digging is passed, you can quickly return the machine to its previous setting.

Finishing Flat Bottom Ditch. Any width ditch is easily and quickly obtainable. Here again the leaning frame can be used to place extra pressure on the blade for extremely hard digging.

NOTE TO OPERATORS

Position changes on this new grader are power controlled by *Natural Action* levers that operate with finger-tip ease in the direction most natural to you. That is, levers controlling movements from side to side, move left and right; those controlling vertical movements, move forward and backward. As a result operation is easy, almost instinctive. There are no combination controls—each movement is individually controlled by a lever in front of the operator. Use of several levers simultaneously speeds up work because resulting relative movements are exact and positive. The leaning frame enables you to keep a level operating platform that's comfortable to work on regardless of grader position. You'll do better work with less effort—continuous ditching with this machine is no more tiring than straight leveling with ordinary graders.

side acted as a stringer and was held in place by a cross stringer at each end having a block nailed to it. Wedges driven between the block and the 2 x 4 stringers held the forms firm while pouring. After the initial set the forms were stripped by merely knocking out the wedges and dropping the sides. The well-oiled partitions dropped the individual blocks and the form was ready for re-assembly.

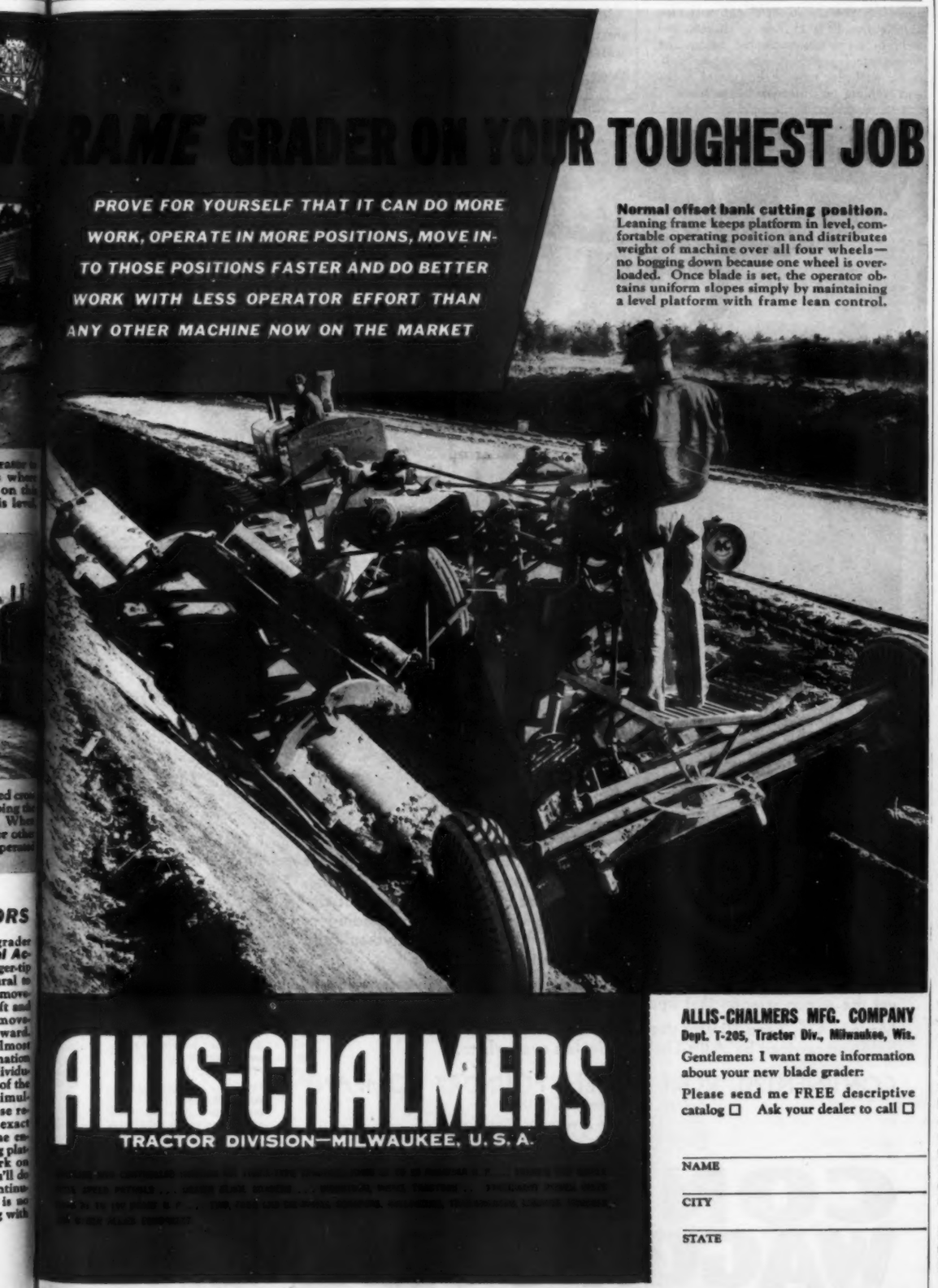
Personnel

The construction of this bridge was a part of Project WPGH 201-F, Warren County, for which L. E. Harris of Dundee, Miss., was the general contractor, and was sublet to The Halloran Co., of Memphis, Tenn., for $33,076.47. L. T. Thorn was General Superintendent for the contractor and W. A. Peardon was General Foreman on this particular bridge. For the Mississippi State Highway Department the work was in charge of A. T. Spengler, Resident Engineer.

New 6-Wheeler Trucks

The addition of fourteen new 6-wheel models to its line of motor trucks has been announced by the Federal Motor Truck Co., Detroit, Mich. These new models, ranging from 2 to 8-ton capacity, include both conventional and cab-over-engine types. Both single and dual-drive models are available, the former for use where roads are good and grades medium and the latter for operation over bad roads, on construction jobs and for snow removal work.

The Timken rear-end units on both the single and dual-drive models incorporate a parallel torque rod system which maintains the vertical position of the axles, regardless of their position relative to each other. Another feature is the full floating rear spring suspension. The ends of each spring rest on hardened steel plates which are part of the axle housings. Each spring is attached to the chassis by means of spring seats which are free to oscillate on a common central tubular pivot member which is rigidly attached to the frame by two support brackets and a girder cross member. The springs are held securely in place on their spring seats by means of substantial spring clips and lateral movement is restricted by the clamping construction of the seats.


RAME GRADER ON YOUR TOUGHEST JOB
PROVE FOR YOURSELF THAT IT CAN DO MORE WORK, OPERATE IN MORE POSITIONS, MOVE INTO THOSE POSITIONS FASTER AND DO BETTER WORK WITH LESS OPERATOR EFFORT THAN ANY OTHER MACHINE NOW ON THE MARKET
Normal offset bank cutting position. Leaning frame keeps platform in level, comfortable operating position and distributes weight of machine over all four wheels—no bogging down because one wheel is overloaded. Once blade is set, the operator obtains uniform slopes simply by maintaining a level platform with frame lean control.
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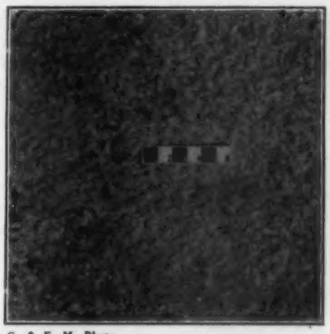
TRACTOR DIVISION—MILWAUKEE, U. S. A.
ALLIS-CHALMERS MFG. COMPANY
Dept. T-205, Tractor Div., Milwaukee, Wis.
Gentlemen: I want more information about your new blade grader:
Please send me FREE descriptive catalog ☐ Ask your dealer to call ☐
NAME
CITY
STATE



C. & E. M. Photo

The Surface Texture of a Completed Tar and Crushed Granite Road-Mix Job in Vermont

Road-Mix Methods On Vermont Highway

(*Continued from page* 1)

through the work as it had to be open to traffic at all times.

A dual-drive Adams grader with a 10-foot blade was used to spread the granite to 16 feet wide for shooting and mixing. The outer foot on either side was left as a safety margin so that none of the aggregate would be lost on the shoulder. This also left a full 2 feet between the aggregate and the tack coat as that had been shot a full 20 feet wide.

After the crushed granite had been spread, all traffic was stopped and the 16-foot layer of granite was shot with 0.45 gallon of tar per square yard. This tar was a special experimental mixture aimed to produce a quick-setting binder material. The tars specified for this job were a THA-1 which according to Vermont specifications is a tar for hot application with a 80 to 200-second float test. The material as furnished to the contractor by the Barrett Co. ran between 100 and 148 seconds at the specified temperature of 32 degrees C. The tar for the mix was a blend of one-third THA-1 and two-thirds of a 35 to 65-viscosity tar supplied by the same company. This blend was used as it would produce less ravelling than is usually encountered when the straight 35 to 65-viscosity tar is used alone.

As the work was handled, the tack coat had at least one week to cure under traffic before the aggregate was placed and the mixing operations started. The mixing of the aggregate and the blended tar was done with a Galion multiple-blade mixer pulled by a Linn tractor and a T-40 International tractor working in tandem. The Galion mixer was pulled up one side and back the other and traffic was permitted to use the road during the operation. This was not a good policy as it made the later mixing more difficult because of the greater density of the material where the rubber tires of the vehicles had compacted the unmixed material or even the mixed material. During the mixing operation a truck was chained to the rear of the mixer to pull the machine toward the outside on the curves.

After the single round trip of the mixer a second shot of tar was applied at the rate of 0.45 gallon per square yard, the same as the first, and another mixing round was made with the Galion machine. Sometimes the Galion had to make a second round trip to complete the mixing of the second application as at that time any deficiency of adhesion of the tar to the stone, due to dust on the granite, was fully apparent. Lack of proper adhesion was overcome by the extra round of mixing after the second shot of tar for the road-mix operation.

Following the completion of the mixing, the Adams grader ran over the material and smoothed it out to a uniform layer over the full 18-foot width of the

(*Continued on page* 32)

C. & E. M. Photo

The 15-Foot Drop Inlet on the Site of the Old Junk Pile

Miss. Roadside Bank Resloped by Dragline

(Continued from page 2)

covering his treasured accumulations of junk from local dumps. In cleaning out the hole, the contractor removed more than twenty truck-loads of non-combustible materials of practically no value and had a huge bonfire of the wood and other trash.

Within this hole a drop inlet of the maximum height, 15 feet, was built and the area around it has been filled, making a welcome addition to the attractive scenery on U. S. 80 as one approaches the Vicksburg National Park and the historic city of Vicksburg from Jackson and the east. A 10-inch Armco corrugated pipe some 50 feet long carries the drainage from the surface spillway to the bottom of the drop inlet at this location.

Personnel

The contract for this work, FAP 184F and NRH 184, was awarded to J. B. Holland of Meridian, Miss., on his bid of $26,000, with an allowance of 105 working days. The work was in charge of R. A. Young as Superintendent for the contractor and for the Mississippi State Highway Department, A. T. Spengler was Project Engineer.

Tractors for Public Work

A new 8-page booklet "Cletrac for Public Work" recently issued by the Cleveland Tractor Co., Cleveland, Ohio, contains a large number of interesting action photographs showing Cletrac tractors in use on all types of work, including highway grading, secondary road work, highway shoulder maintenance, road-mix, clearing, snow removal and many others.

Copies of this booklet may be secured by interested contractors and state and county highway engineers by writing direct to the manufacturer and mentioning this magazine.

New P & H Dealers

Two new distributors for the Harnischfeger Corp. of Milwaukee, Wis., in the state of North Carolina were recently announced. The Constructors Supply Co., Inc., of Durham, N. C., has been appointed as exclusive excavator agent for the entire state and will also handle the P & H line of hoists and welders on a non-exclusive basis. The North Carolina Equipment Co., Raleigh, N. C., will also handle the sale of hoists and welders on a non-exclusive basis.

New Lighting Handbook

Because of rapid advances made in the art and science of lighting during the past two years, and to provide a ready source of up-to-the-minute information on lighting for the illuminating engineer, the Westinghouse Lamp Division of the Westinghouse Electric & Mfg. Co. has announced a completely revised edition of its lighting handbook.

Titled "Artificial Light and Its Applications," this new larger and more comprehensive edition covers the entire field of lighting, including street and highway lighting. Copies may be secured from the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Price: 75 cents.

BROS RUBBER TIRED ROAD ROLLER
For immediate complete compaction

The many specifications demanding its use for:
Stabilized aggregates
Crushed rock bases
Bituminous mats
Dirt fills
are best evidence of the perfect results obtained.

Made under Patent No. 2024184

Wm. Bros Boiler & Mfg. Co. Minneapolis, Minnesota

No Wonder they Prefer CONTINENTALS

Continentals get the load over the edge! This 7-yarder is handling 8-yard loads of loose dirt on a highway relocation job.

Right: A 10-yarder posed to show why Continentals dig faster, fuller loads—the entire weight of the scraper, plus the full power of the tractor, is exerted on the blade!

Continentals move dirt faster with less power and at a lower cost than any other dirt moving equipment made. They do things no other wagon scraper *can do—back-dumping over the edge of a fill without the need for bulldozing; digging with the full weight of the scraper on the blade; backing without zig-zagging.* Every operation — digging, back-dumping, spreading, grading or windrow dumping — requires a minimum of tractor power and is hydraulically controlled. Operation is as simple as turning a faucet.

For bigger loads, more trips per day, less maintenance and greater earnings, get the wagon scrapers that operators prefer—*Continentals.*

Made in 4, 5, 7 and 10 yard sizes on low pressure tires or mounted on crawlers. Sold and serviced by Allis-Chalmers dealers everywhere.

CONTINENTAL ROLL & STEEL FOUNDRY COMPANY
Tractor Equipment Division
Railroad Avenue
EAST CHICAGO, INDIANA

TYPICAL PRAISE from USERS:

(Excerpts of letters taken from our files.)

"The money-makingest dirt mover we've ever owned. We can bid lower and still make more. From now on, it's Continentals exclusively for us!"

"Continentals work while other dirt moving outfits sleep. They get more done on straight hauls and eliminate bulldozing for us."

"We'd be paying through the nose if we hadn't investigated Continentals before buying. You didn't overrate them a bit."

"They hog up gumbo, sand, wet clay, imbedded roots and rocks just like you'd take a dipper full of water—never saw anything like it. Wish our old-fashioned four-wheel rigs could work like Continentals."

CONTINENTAL WAGON SCRAPERS

JACKSON VIBRATORS

4" DIAMETER FLEXIBLE HANDLE

The machine illustrated is equipped with a 12 ft. flexible hose handle, quickly interchangeable with other flexible and rigid handles to fit the VS-E1 for all jobs.

VS-E1 VIBRO-SPADE
•
DEPENDABLE CONCRETE VIBRATOR

An electric internal vibrator for general use . . . VS-E1's are properly placing stiff concrete on bridges, buildings, retaining walls, dams, locks and breakwaters all over the world.

Write for full information

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

Prestressing Cable for the Rio Magdalena Bridge in Colombia, S. A.

Set of Cables Leave For Colombian Bridge

The cables for the new steel bridge being constructed over the Rio Magdelena in Colombia, South America, were made at the Williamsport plant of the Bethlehem Steel Co., which also fabricated the steel for the bridge.

The accompanying photograph shows one of the cables as it is being coupled to a prestressing machine which takes the excess stretch out of the cables. The eight cables, which are 2⅝-inch in diameter, were prestressed by this means to a maximum load of 183,000 pounds. As applied in the bridge, they will be 860 feet in length and will carry a span of 512 feet. Of the total load that the cables will carry, 116,000 pounds will be dead load, causing a permanent elongation in service of 1.8 feet, and the remainder will be a live load sufficient to cause temporary elongation of 0.9 foot in addition. As a result of this elasticity, the rise and fall of the roadway at the center of the bridge can be as much as 2 feet. Each cable has a required breaking strength of 566,000 and developed a breaking strength of 660,000 pounds, as tested by the U. S. Bureau of Standards.

RoadMarkingCompound Has Many Other Uses

Recent developments in the use of Hysap highway marking compound, which was designed for use by municipalities for traffic lines, have shown a number of ways in which it can be used by state and county highway departments.

This compound consists of a binder compound having the appearance of paint and which is applied similarly, either with a brush or paint spraying device, on which are placed tiny glass spheres, approximately 0.015 inch in diameter, which become luminous in the light of on-coming headlights. Some of the uses of this compound, in addition to traffic lines, are for painting wooden guard rail, telegraph poles, traffic warning and direction signs, center stripes on curves, underpass abutments and barricades for construction work.

One highway engineer reported taking strips of soft wood ½ inch thick, 6 inches wide and 4 feet long, and painting them with 3-inch diagonal black stripes, leaving a 3-inch space between stripes. When fully dry, these spaces were filled with the white or yellow Hysap compound and covered with the glass spheres. One or more of these strips was nailed to telephone or telegraph poles, trees, fence posts, mounted about 2 feet above the surface of the road and at an angle of about 30 degrees to the line of the highway. It is reported that these markers were visible for at least a quarter of a mile. The compound has also been applied by brush directly to curbs, poles, guard rails, bridge abutments, fences and even to the rear end of maintenance trucks, the wet compound being sprayed immediately with the glass spheres.

Complete information on Hysap compound and its use in making signs or dangerous objects visible at night may be secured from the Highway Safety Products Corp., Empire State Bldg., New York City.

Welding Electrode Booklet

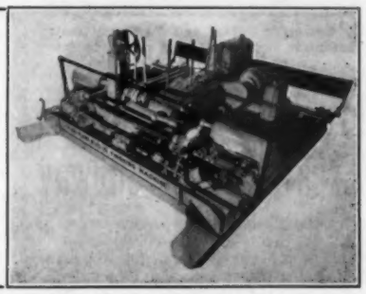
Champion welding electrodes for electric welding, in a variety of types to meet the requirements of fabrication, construction and maintenance work, are described in detail in a new 56-page well-illustrated catalog recently issued by the Champion Rivet Co., Harvard Ave. at East 108th St., Cleveland, Ohio. In addition, this booklet contains considerable reference information.

Copies of "Champion Welding Electrodes" may be secured by interested contractors and engineers direct from the company by mentioning this magazine.

"SPEED—PROFIT—SATISFACTION"

Three in one when you use "FLEX-PLANE" finishing machines, joint installing machines, and dowel rod spotters.

FLEXIBLE ROAD JOINT MACHINE CO.
WARREN, OHIO



USE RIGHT BUCKET FOR THE JOB

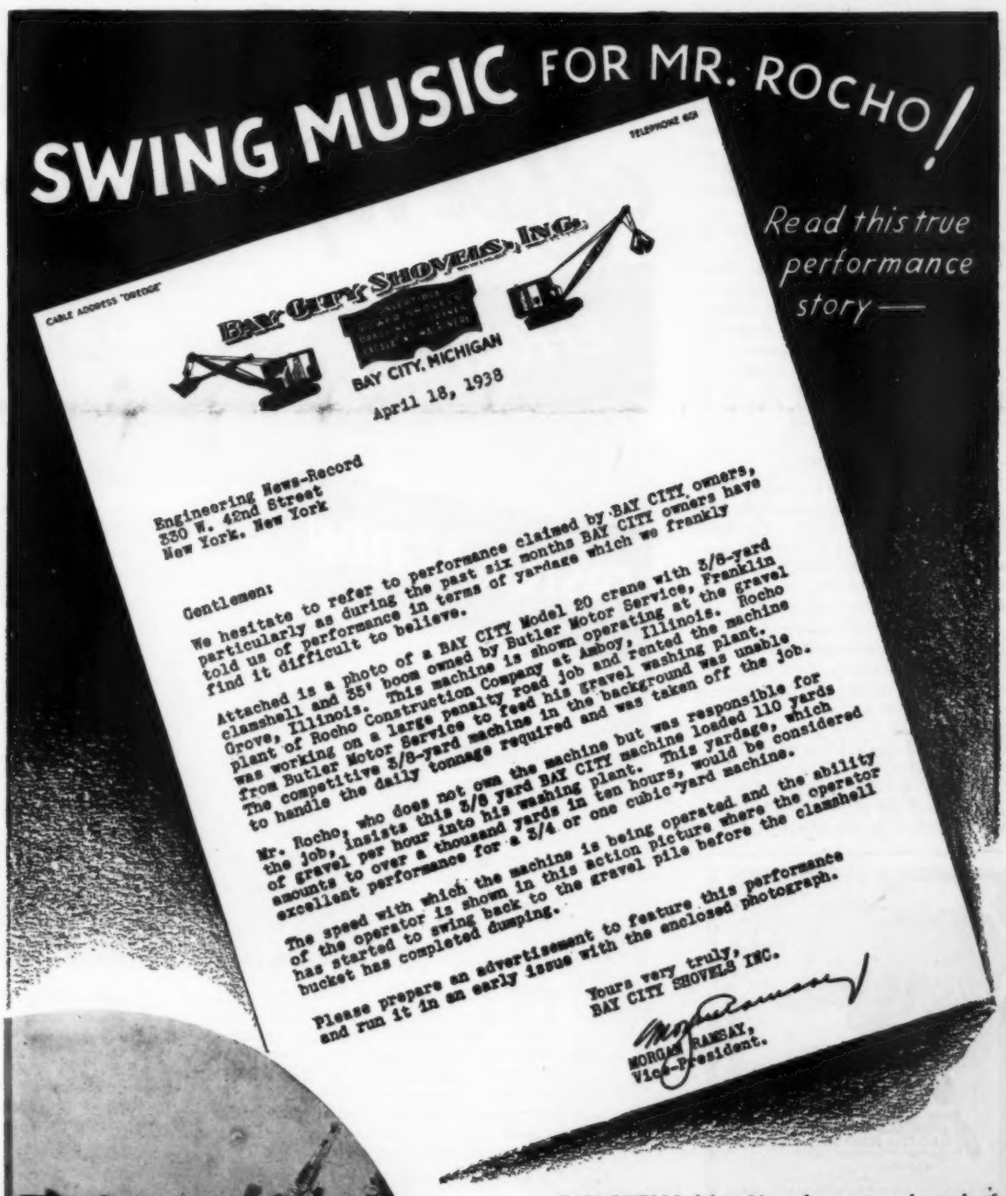
Hayward makes all four — clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.

THE HAYWARD CO., 32-36 Dey St., New York

HAYWARD BUCKETS

SWING MUSIC FOR MR. ROCHO!

Read this true performance story—



BAY CITY SHOVELS, INC.
BAY CITY, MICHIGAN
April 18, 1938

Engineering News-Record
330 W. 42nd Street
New York, New York

Gentlemen:

We hesitate to refer to performance claimed by BAY CITY owners, particularly as during the past six months BAY CITY owners have told us of performance in terms of yardage which we frankly find it difficult to believe.

Attached is a photo of a BAY CITY Model 20 crane with 3/8-yard clamshell and 35' boom owned by Butler Motor Service, Franklin Grove, Illinois. This machine is shown operating at the gravel plant of Rocho Construction Company at Amboy, Illinois. Rocho was working on a large penalty road job and rented the machine from Butler Motor Service to feed his gravel washing plant. The competitive 3/8-yard machine in the background was unable to handle the daily tonnage required and was taken off the job.

Mr. Rocho, who does not own the machine but was responsible for the job, insists this 3/8 yard BAY CITY machine loaded 110 yards of gravel per hour into his washing plant. This yardage, which amounts to over a thousand yards in ten hours, would be considered excellent performance for a 3/4 or one cubic-yard machine.

The speed with which the machine is being operated and the ability of the operator is shown in this action picture where the operator has started to swing back to the gravel pile before the clamshell bucket has completed dumping.

Please prepare an advertisement to feature this performance and run it in an early issue with the enclosed photograph.

Yours very truly,
BAY CITY SHOVELS INC.
MORGAN RANEAY,
Vice-President.

BAY CITY Model 20-⅜-yard crane was the neck of the bottle. . . . Its capacity was the entire plant's capacity . . . so says Stanley E. Bates of Tractor & Equipment Co., who adds: *"Careful, conservative, cautious Mr. Rocho stated that the little Bay City 20 started 110 cu. yds. of gravel through the plant per hour, day in and day out, for several weeks! If any Bay City salesman ever claimed HALF that production to a prospect he would be put down as a colossal liar."*

If you like this swing music see your dealer or write Bay City Shovels, Inc., Bay City, Mich.

A Caterpillar RD4 and LaPlant-Choate Bulldozer Push the Earth and Rock Into Location for the Shovels

Problems of Open Cut Excavation for Subway

(Continued from page 5)

a leaky pipe or flow creates a serious health hazard, to say nothing of the odors created about the work. This contractor uses 12-inch welded steel pipe as an interceptor for all house sewers at the building line. This house interceptor is connected at the end of each block to the main sewer bypass. This is a 36-inch steel pipe hung from the deck beams and made with flanged joints with gaskets between to eliminate all leakage. All connections to the main flume from the house service mains as well as the sewer flumes from side streets are welded for strength and to prevent leakage.

Water lines are carefully hung from the deck beams in such a way as to be clear of all excavation and equipment which might cause breakage. Complete instructions are given to all foremen for speedy shut-offs of lines running through or crossing the excavation so as to minimize any possibility of flooding the job.

Underpinning

For underpinning the Hudson & Manhattan structure, underpinning pits 3½ feet wide and 4 feet from front to back are carefully excavated by skilled laborers who line the pits with timber, excavating the depth of only one board at a time and carefully fitting all planks to insure stability and safety of the pit. When the pit is excavated and horizontally sheeted to a depth of 6 feet, a steel plate 15 inches square x 1 inch thick is placed in a true horizontal plane and backed up with a dry grout of quick-setting cement against the underside of the foundation above. The plate is held in place by wooden cleats which also support a locking plate which holds the inverted jack, thus eliminating the need for moving the jack every time a new sleeve or cylinder is added.

Pretest pile shells, consisting of sheet steel cylinders 4 feet long and 14 inches in diameter, are braced accurately in position, carefully plumbed and then pressed into the ground with the jacks. As the cylinder is jacked downward, short I-beam fillers are placed between the jack and the pile section to a maximum height of 4 feet, at which point an interior sleeve is placed on the cylinder and another 4-foot section added and the driving continued with the hydraulic jack. Pressures up to 5,000 pounds per square inch are used for this work. The Pretest piles are all driven in advance to a point below the final subgrade of the adjoining subway excavation.

The cylinders are mucked out by hand scoops, post hole diggers, and small orangepeel buckets for the greater depths. After mucking to the bottom of the cylinder, it is filled with ready-mixed concrete delivered as required. When the concrete has set in the pile, another 15 x 15-inch steel plate is set in a horizontal plane on top of the pile backed by a quick-setting cement to give full uniform bearing. Two hydraulic jacks are then set upright with a clear space of 6 inches between and "siamesed" to a single hydraulic pump or to the main hydraulic line and with the two jacks acting together a load is applied to the pile against the structure being underpinned. The test is carried to a load approximately 50 per cent greater than the computed duty load for the pile.

This creates below the bottom of the pile what is termed in soil mechanics "the bulb of pressure." While the jack load is maintained a squared end section of heavy I beam is placed vertically between the jacks and wedged against the top plate with smooth steel wedges until the pressure gage drops sufficiently to indicate that the wedge beam is carrying the full load. The jacks are then removed and the wedging beam, preventing a rebound of the pile, transmits through the pile the full load of the

(Continued on next page)

NEW 6" PUMP

Heavy-duty design. Ideal for wellpoint service, bridge pier holes, etc., when large capacity is required.

Compact design. Oil seal eliminating packing. Tremendous capacity—90,000 gph. Automatic priming, without handles requiring adjustment. Easy accessibility.

Ask for Bulletin CEM-38

MARLOW PUMPS

Ridgewood New Jersey

ALL STEEL HAND HOIST

SEATTLE, U.S.A.

COMPACT—POWERFUL—SAFE

"For use where power is not practical or available"

Manufactured in 2, 5 and 15-Ton Sizes.

For capacity comparison, ½" cable used:

2-Ton "Lightweight" ..... 75 ft.
5-Ton "General Utility" ..... 250 ft.
15-Ton Triple-Geared "Special" ..... 1200 ft.

Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price
2-Ton 4, 8 & 22 to 1	60 lb.	$50
5-Ton 4 & 24 to 1	110 lb.	$75
15-Ton 4, 19 & 109 to 1	680 lb.	$200

BEEBE BROS.

2724 6th Ave., So., SEATTLE, WASH.

Warehouse stocks for dealers' Supply: Seattle—Chicago—Brooklyn—Houston. Complete Literature and List of Dealers in Principal U. S. Cities and Foreign Countries Gladly Mailed.

Only ADNUN can offer Hydraulic Controls

THE new Adnun Black Top Paver decidedly "steps up" paving operations with this exclusive feature. Hydraulically operated and controlled from a single lever bank, the entire equipment manipulation is performed faster and with no physical exertion. This permits the operator to make almost instant adjustments to meet every condition and allows him more freedom to watch his work.

These Adnun features are:

1. Power cut-off gates in the hopper in four sections, each section individually hydraulically controlled.

2. End gates lift for delivery of material to curb or shoulder direct from the hydraulic control bank.

3. Screed with overlapping action instantly lifted at either or both ends for Super Elevation or for passing over manholes or other obstructions.

These features are the key to better road paving—the way to bigger profits—and they can be bought only on the Adnun.

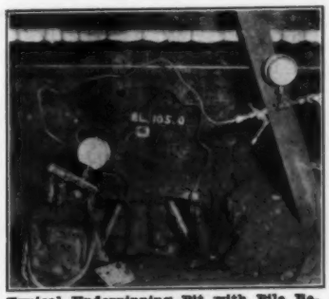
See the new Adnun Black Top Paver before you make your buy.

THE FOOTE COMPANY, INC., Nunda, New York

ADNUN

TRADE MARK REGISTERED

BLACK TOP PAVER with Hydraulic Controls



Typical Underpinning Pit with Pile Being Protested by a Hook-Up with a Hand Hydraulic Jack for Starting the Load and Main-Line Hydraulic Pressure for Higher Loading

New York City Subway Presents Many Problems

(*Continued from preceding page*)

underpinned structure to the bulb of pressure below.

Minimum Backfill

On the Hudson & Manhattan side the underpinning piles at 10-foot intervals are 2 feet back of the face of the Tube. If interpile horizontal sheeting were placed between the underpinning piles as subway excavation was carried below the Tube structure, much backfill would be required. To save this excavation and backfill, vertical H-beam master piles are driven on the neat line of the new subway in front of each underpinning pile and tied into the concrete filling the pits around each underpinning pile. Horizontal interpile sheeting is set against the back of the front flange of the vertical H beams. This sheeting acts as the back form of the waterproofing "sand wall."

On the building side the neat line of the new subway structure is at the face of the horizontal wales which engage the cross braces. After the underpinning piles are jacked, spaced 10 feet apart uniformly or closer under building columns, excavation is started and horizontal interpile sheeting of old timber is set between the piles with 1½-inch openings. These openings are packed with sand or fine gravel to permit free drainage of the ground behind.

Excavation is continued to subgrade and at intervals steel wales and steel cross braces are installed. Each tier of cross braces and wales is hung from the tier above with tie rods and an accompanying square timber post adjacent acts as a compression member, giving the bracing system the stability of a truss.

When excavation reaches subgrade, vertical beams on 10-foot centers are attached to the bottom wale and concreted into the subgrade concrete on the neat line. Horizontal interpile sheeting is held against the front flanges of these vertical I-beams and the space between this interpile sheeting and that placed back of the underpinning piles is filled with selected sand thoroughly rammed up to the elevation of the lowest wale. Then the panels of the front forms for the 4-inch "sand wall" are placed and concrete poured, using the front horizontal interpile sheeting as a back form. This backfilling and concreting is continued upward to the top of the subway structure.

Drainage

Manhattan "bulls liver" is one of the meanest materials to drain satisfactorily. It has 48 per cent voids and is composed of sharp irregular crystals of quartz and other minerals. When water is released from this material it is likely to be carried along with the water, and for this reason, as excavation proceeds in the bulls liver, coarse sand is cast over the edge of the bank to hold it in place while draining.

The drainage of the open excavation was remarkably complete, permitting all excavation in the dry even without the use of wellpoints. In the first place, the interpile sheeting permitted water in the soil adjacent to the excavation to drain readily, preventing boiling at the bottom of the excavation which would have occurred had tight sheet piling been used. The center of the excavation was kept below the general grade of excavation at all times, leaving an open drain leading to special open sumps continuously unwatered by Jaeger self-priming electric pumps with 4-inch suction and 3-inch discharge delivering to the sewer flume. The open sumps consist of 8-inch steel sheet piling driven in a circle 5 feet in diameter with a light pneumatic hammer to a maximum depth of 20 feet from ground water level. The inside was then excavated under water with a small orangepeel bucket and then a pre-built frame carrying ¼-inch wire mesh was centered in the ring of sheeting and the space between backfilled with a uniform size of roofing gravel. Following this, the sheet piling was pulled with a Vulcan pile extractor, leaving the gravel wall well in place, into which water from the center trench or drain flowed freely. It also drained the adjacent ground.

Throughout excavation in this material, an open V drain with flat slopes is kept open in the center to collect the water as it drains slowly from the material. No attempt is made to force this, as a slight head of water creates boils. The material as it drains is excavated in thin layers over a long stretch, a type of excavation known as "peeling the onion." This work is done by hand, loading to skips handled by the cranes through hatches in the sidewalk decking. It is possible at all times, in spite of a ground water elevation 23 feet above base grade, to walk through the

(*Continued on page 28*)

TARPAULINS
WRITE FOR SAMPLES AND PRICES
ROAD MATS
WINDBREAKS
CONTRACTORS SUPPLY DEALERS in every state sell the Fulton line. Specify SHURE-DRY and FULTEX Tents, Tarpaulins, and Windbreaks—anything made of canvas. Also Fulton Road Mats and Burlap. Fulton products are good and their prices are right. If your dealer can't supply you write our nearest plant for catalog, samples and price list.
Fulton Bag & Cotton Mills
Manufacturers Since 1870
ATLANTA ST. LOUIS DALLAS
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Line & Surface LEVEL

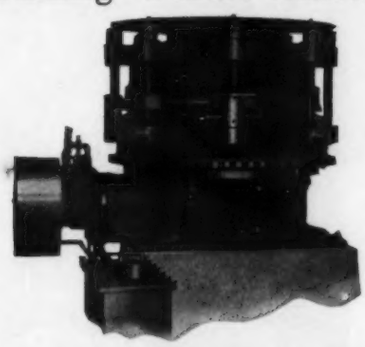
Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8531 Gratiot Ave. Detroit, Mich.

Plus PERFORMANCE
minus MAINTENANCE

finer crushing—a more cubical product



TELSMITH GYRASPHERE CRUSHER

takes an unlimited and unregulated choke feed when other secondary crushers can't. Like a mortar and pestle... only inverted for easy discharge ... the spherical head and its corresponding concave catch and break chunks of rock between two multi-curved surfaces—a perfect *cubing* action. A finer, faster secondary crusher that takes less power ... and less up-keep. *Write for descriptive Bulletin Y-34*

You get more crushing strokes per minute with the Telsmith-Wheeling Jaw Crusher...and greater reduction in *one* process. Roller bearings almost double capacity, cut power consumption per ton, reduce up-keep. Because its frame and jaw are massive steel castings, its shaft a big steel forging—Telsmith is almost a permanent investment. Adjustable for a wide range of product sizing. Seven sizes. *Write for Bulletin W-34.*

Sand, gravel, crushed rock, ore, coal—Telsmith Pulsator screens 'em all, wet or dry, and does it *right.* Its circular movement produces a maximum screening action that's *uniform* on every inch of the wire, regardless of load. Telsmith builds in greater value, longer life and lower up-keep with the toughest alloy steels, anti-friction bearings and special seal protection for working parts. Single, double or triple deck; 11 sizes. *Write today for Bulletin V-34.*

TELSMITH

County Road Paved With Pre-Coat Mix

(*Continued from page 11*)

was experienced with asphalt on the penetration surface.

The plant furnished for this work was required to have a daily capacity of 400 tons in 8 hours, but the hauling equipment furnished required that the plant be shut down periodically so that the maximum amount of mixed material hauled away in 10 hours was only 380 tons, using both WPA and county-owned trucks.

Preparation of Base

After the base had been widened to the 18 feet desired, it was shot with a prime of AES-2 56 per cent asphalt at ¼-gallon per square yard, using a 9-foot spray bar on the distributor. This material was allowed to cure on the road without traffic for about two days to a week and then the loose material was bladed back to the road from the shoulders and the road maintained with an Adams 12-foot patrol grader and rolled with a 10-ton Huber gas-powered roller. After two to three days of this maintenance the road was ready for the spreading of the cold mix pre-coat.

Spreading the Emulsion Mix

The hauling trucks used a detour so that they did not travel over the section of road that had already been spread. They backed in to the Galion spreader boxes from the nearest cross road and two men attached the 8-foot boxes which were set high so that there would be sufficient material to rake out to the 9-foot width. Two boxes were used across the road, spreading against wood forms on some sections and against a slight raised shoulder of earth on the remainder of the job. Three men raked behind each box and as they were not experienced rakers the surface was somewhat irregular. This was corrected by pulling a No. 6 Adams maintainer over the surface to smooth it out before rolling with the 10-ton Huber roller. The roller was run with the outside rolls half on the shoulder and half on the black top on the first run down the road and the same on the return trip up the other side to stabilize the edges first. The rolling was continued for three successive days and then the road opened to traffic.

The Seal Coat

The inverted seal was used on this job. Pea gravel was spread from the tail gate of trucks and hand-broomed to an even distribution over the surface and then dragged with multiple groups of old tires. The pea gravel was spread at about 5 to 8 pounds per square yard. This was shot with 0.2 gallon of AES-3 and covered with coarse torpedo sand, broomed and dragged.

The Allied Bituminous Products Co. of Indianapolis, Ind., applied the prime and seal coats on this job. The County furnished part of the trucks, the aggregate and sand for the seal and spread it. There was no contractor as such on the job. The entire work was done by WPA labor and the hiring of such equipment as was required was under the direction of the WPA engineer, Eugene D. Foley. Herbert Bloemker is County Surveyor of Marion County, Indianapolis, Ind., and was responsible for setting up this WPA paving project.

Stabilizing Road Soils

To provide contractors and state and county highway engineers with practical and technical information on the effects of calcium chloride in stabilizing soil mixtures, the Calcium Chloride Association has recently issued a brief entitled "The Stabilizing Effects of Calcium Chloride." This folder, quoting from data secured by the U. S. Bureau of Public Roads, explains the effect of calcium chloride in producing greater density and better compaction of soil mixtures and answers many questions on the behavior of soils.

A copy of this new folder No. 134 may be secured upon request from the Calcium Chloride Association, Penobscot Bldg., Detroit, Mich.

UNION *Roller Bearing* **CONCRETE BUCKET**

Will save you Time and Money

Single-line central controlled discharge. Radial gate suspended on roller bearings. Finger-tip control. Grout tight in transit. No sway or kick during discharge. Can be used for narrow forms or columns. Strongly made. Capacities: 18, 34, 64, 92-cubic-foot water level.

Write for Bulletins

UNION IRON WORKS, INC. P. O. Box 18 ELIZABETH, N. J.

• Time and again word has come to us that the men are going to work early to be sure of getting a Cleveland, rather than some other drill that might be available. It is a well-known fact that Cleveland Drills turn out a lot of footage in a day—that they are easy to hold—handy to control—that they give less trouble, use less air—that they are generally more satisfactory alike to operator and owner.

It's no wonder, then, that Mike wants to be early to work, and that Mary has to "step on it," thus doing her part in making sure Mike gets the drill he knows he can turn out the footage with. Your men, too, will like Clevelands. And you will want no other make when once you have had these fast, efficient, machines on your job. Demonstrated any time, anywhere. Let us send the new Bulletin 122.

THE CLEVELAND ROCK DRILL COMPANY

3734 EAST 78TH STREET • CLEVELAND, OHIO

Cable Address: ROCKDRILL

LEADERS IN DRILLING EQUIPMENT

Be sure it's the

GIANTGRIP T STRAIGHTEDGE

Either Steel or Aluminum

For Checking Concrete Surface

Two useable edges:—one sharp-cornered and squared for scraping; the other rounded for line-point straightedging.

ASK YOUR DEALER

L & M Manufacturing Co.

(Division of Mondie Forge Co.)

16302 BEREA RD., CLEVELAND, OHIO

The New Lanco Wheelbarrow-Mixer

Combined Wheelbarrow And Concrete Mixer

A new piece of equipment, designed for the mixing, transportation and placing of concrete on small jobs, is the Lanco wheelbarrow-concrete mixer recently announced by the Lansing Co., Lansing, Mich.

This new unit consists of a small mixer drum mounted on a wheelbarrow frame with a 12-inch pneumatic-tired wheel. The drum is water-tight and measures 21 inches deep and 17 inches in diameter at the bottom. It is equipped with four large curved paddles which mix the concrete in a few seconds as the operator wheels the mixer from the stockpiles to the forms. At the top of the mixer, which is 13 inches in diameter, is an iron nose extending beyond the wheel to allow the drum to be dumped easily in any direction. The frame and legs are of 1½-inch channel iron, well-braced and the hand holds are of pipe. The complete unit weighs 70 pounds.

Literature describing this new Lanco wheelbarrow-concrete mixer may be secured direct from the manufacturer.

New Light-Weight Pump

The new C. H. & E. No. 40 Fly-Wate self-priming centrifugal pump recently announced by the C. H. & E. Mfg. Co., Inc., 3849 No. Palmer St., Milwaukee, Wis., is a general utility pump combining capacity with portability. Made of aluminum alloy, this pump has a 1½-inch suction, 1½-inch discharge and is close-coupled to a husky 1-hp single-cylinder air-cooled engine.

Features of the pump are the new self-feeding oil seal, using ordinary crankcase oil; a high efficiency discharge volute; and 100 per cent positive recirculation cut-off valve. The outfit is mounted on a steel skid with a convenient lifting handle. The weight of the complete unit is 60 pounds, its overall height, 17 inches; width, 14 inches; and length, 19 inches.

Redesigned Line of Hoists and Dump Bodies

A complete redesigned line of hoists and dump bodies for 1½ and 2-ton truck chassis, both long and short wheelbase, together with an improved line of heavy-duty dump bodies, hydraulic hoists and mechanical hoists, was announced by the Hoist and Body Division, Gar Wood Industries, Inc., Detroit, Mich., for 1938. These new Gar Wood units have many new improvements, featuring greater strength, reduced weights, lower mounting height, greater dumping angle and modern appearance.

Models D6, D7 and D7L direct-lift hydraulic hoists have been completely redesigned. Steel forgings and lighter but stronger stampings are used extensively. Box-type tail-gate construction and a lighter body trunnion, tested to 55,000 pounds without yielding, are features of the Type C dump bodies.

New literature on this complete line of hoists and dump bodies may be secured direct from the manufacturer by mentioning this magazine.

MALL Concrete Vibrator with gas engine power unit. The same machine can be used for concrete surfacing.

A "JACK OF ALL TRADES"

OLD STUFF, YOU SAY? LISTEN TO THIS!

ONE MALL power unit will VIBRATE concrete and SURFACE the concrete after the forms are stripped. You can use it, too, for DRILLING, PUMPING, GRINDING, or SAWING. How? By simply attaching the required tool for each application.

These versatile tools will earn big dividends on your next job. We'll gladly send bulletins.

MALL TOOL COMPANY

7743 SOUTH CHICAGO AVENUE, CHICAGO, ILLINOIS

OFFICES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Use the ROLL-A-PLANE From SUBGRADE TO WEARING COURSE For ROADS THAT LAST LONGER . . . CAN BE BUILT CHEAPER . . . REQUIRE LESS MAINTENANCE

● Powerful SPOT PRESSURE action—an exclusive Roll-A-Plane feature—irons out high spots and fills voids which conventional rollers miss. It prevents waviness and non-uniformity of compaction . . . cuts rolling time 30 to 50% by eliminating the necessity for cross rolling. By Roll-A-Plane-ing from subgrade to wearing course, asphaltic and other types of low cost compacted roads assure longer service with low maintenance cost, because the disintegrating impact of high speed traffic is reduced to a minimum.

Now . . . through the application of Roll-A-Plane SPOT PRESSURE action from subgrade to wearing course . . . real straight edge smooth surfaces are possible and economical. Surface variations can easily be held to less than ⅛ of an inch in ten feet. Because surface smoothness and necessary compaction are secured with a minimum of rolling, the full potential strength of the asphalt or oil is maintained while rolling costs are reduced substantially.

Write for Bulletin No. 1614 fully describing the complete line of A-W Roll-A-Planes as well as construction and maintenance economies they make possible.

AUSTIN-WESTERN

☐ Send a representative. Tell me about:

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JAEGER PAVER has 10 ADVANTAGES:

- 18 Ft. Movable Forms Give Smoothness of Concrete,
- 50% More Traction,
- No Load on New Material,
- Adjustable 9 to 14 Ft. Widths,
- Blends Perfect Joints,
- Capacity to 1000 Tons a Day,
- Lays Hot or Cold Bituminous, Stone or Macadam,
- Pug Mill Spreader,
- Less Hand Finishing,
- Automotive Construction,

Write for New Catalog, Prices.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

JAEGER

C. & E. M. Photo

Swinging the Steam Pile Hammer Onto an H-Beam Batter Pile on the North Abutment Preparatory to Driving

Narrow Underpass In Maine Replaced

(*Continued from page 2*)

possible. It was expected that the softer clay would be squeezed out as the fills neared their full height, so tell-tales were set in the trenches. They were wood plates with tripods on top supporting vertical 2 x 4's on which was marked the original height according to a wire stretched across the trench. Any movement of the softer clay would be recorded at once by the tripod.

No movement was noted in the north approach fill but on the south fill on September 17, after two days of heavy rain within the week and just at the time that the fill reached full height, a slip started which took out the westerly third of the fill, completely blocking the relief trench. The failure was caused by the soft clay being pushed out underneath the berm line and over to the relief ditch.

To correct this it was decided not to excavate again the portion of the relief trench which was filled by the slide, but rather to fill the remainder with heavy gravel. Next a 2 to 1 slope was made in front of the site of the abutment. Then the area where the slump occurred was filled to a height of 5 feet above grade. As no further movement was noted, the contractor started driving the abutment piles.

Building the Approach Fills

The contractor opened a gravel pit about 1 mile north of the job, and, after stripping the loam, excavated the entire fill material with a Lima 1¼-yard shovel and a 1½-yard Lorain, loading to a fleet of trucks half hired and half owned by the contractor. The fill was end-dumped and then bulldozed into 12-inch layers. It was not rolled as the trucks and tractors compacted the gravel very well. An Allis-Chalmers 35 tractor with a Niess mechanically-controlled bulldozer and an A-C Model K with a Baker bulldozer did the spreading of the fill material.

Before the fill was started a pit was dug on the center line of the fill, at the point of maximum depth, just big enough to contain a nail keg. This was placed with a platform 6 feet square on top and a length of 3-inch pipe set in the keg with concrete. Levels were taken on the top of the pipe as the fill was raised and the pipe was increased in height by adding more lengths to keep the top above the fill. A uniform compression or compaction of the ground beneath the two fills of about 4 inches was observed. The slip in the south approach fill did not have any effect on the center line, showing that there was no movement of the soft clay at that point.

The ground on the site of the fills was stripped only for the portions where the fill would be 3 feet or less in height. Side slopes of 1¾ to 1 were maintained on the fills.

The Concrete Structure

The concrete structure consists of five pairs of piers and six spans with open abutments built on the fills and supported by H-beams. The overpass has, successively, spans of 50, 65, 73, 73, 65 and 50 feet, and is 57 feet wide out to out, carrying two 22-foot roadways and two 3-foot sidewalks. In the center is a 3-foot raised strip with 1-foot sloping curbs.

The north abutment is supported on eleven front batter piles, nine vertical center piles and two end batter piles, and four back batter piles, all 46-foot H-beams 12 inches square and weighing 53 pounds per foot. The south abutment is the same, except that the piles are 66 feet long. The piles were cut off 4 feet above the base of the abutment concrete and a steel pile cap 14 inches square and 1¼-inch thick welded to the pile. The abutments are 58 feet long and 7 feet 6 inches wide at the base. The front and back batter is 2½ inches per foot. On the front, the bridge seat, 2 feet wide, is located 6 feet from the base and the total height of the abutment is 11 feet.

The Bridge Piers

For convenience in reference the bridge piers were numbered, starting at the south end, with the odd numbers on the west side and the even numbers on the east side. The excavation for the footings of the piers, which are spaced 38 feet 5 inches laterally, was carried to a depth of 6 feet below ground level except for the piers within the railroad fill where the excavation was 8 feet below the railroad tracks through the railroad embankment, carrying it just about to original ground level.

The footings are 10 feet 6 inches square and 4½ feet deep, carried on twelve piles of 10-inch, 42-pound H-beams per footing driven to depths varying uniformly from 11 to 31 feet, according to the ledge elevations. Twelve piles were used for piers 1, 2, 3, 8, 9, and 10 while sixteen piles of the same size were used under piers 4 and 7 paral-

(*Continued on page 35*)

PATENTS APPLIED FOR

. . fast, economical
Made entirely of steel — equipped with pneumatic rubber wheel. .
Mixes batch about 2 cubic feet while operator walks 40 - 50 feet.
Demand amazing — a FAST seller.
Order NOW! Get prices, details.

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PERFORMANCE . . .

- Rogers Trailers embody the three features vital to satisfactory performance—
  1. Quick, easy LOADABILITY due to low construction—
  2. Speedy, less costly HAULABILITY because of exceptional lightness with strength—
  3. Safe, dependable BRAKEABILITY under all conditions in the new equalizing brake system.

For the utmost in proven design and value, investigate Rogers Trailers. Write for the Rogers catalog.

ROGERS BROTHERS CORPORATION, 108 Orchard St., Albion, Pa.

EXPERIENCE *built it* . . .
PERFORMANCE *sold it* . . .

ROGERS HEAVY DUTY Gooseneck Trailers

Completely ELECTRICALLY WELDED *to combine* LIGHTNESS *with* STRENGTH

Extra PRODUCTION AT HIS FINGERTIPS!

● Greater profits are yours when production increases. Operators step up hourly out-put with the Air-Controlled Michigan Truck Shovel-Crane—do it faster, more efficiently. Air-controls, high speed and truck economy enable Michigan users to widen their range of profitable operations at minimum investment.

Write for Bulletins "C" and "C2"

MICHIGAN POWER SHOVEL CO BENTON HARBOR, MICHIGAN, U.S.A.

Counties to Rebuild Highway in Georgia

(*Continued from page 17*)

Sylvania. Unless an adequate road is provided from Savannah south into Florida, the full volume of traffic over the Oglethorpe National Parkway Trail can not be expected as a portion of the traffic will be diverted over competing roads to the west.

Zoning Program

Four of the six counties already have adequate zoning legislation to protect a right-of-way 400 feet wide the length of the highway in those counties against the intrusion of undesirable structures and unsightly and dangerous signs. A Regional Zoning Board has been appointed to administer the legislation for zoning. Perhaps the worst strip of the entire highway between Savannah and the Florida border is that immediately north of Brunswick where the commercial rivalry of several pecan dealers has taken every bit of beauty from the highway and adjacent country with signs urging the traveler to purchase at the "2nd Station" and "Don't be misled, Buy at the 3rd Station." Removal of objectionable signs has already been started in Glynn County. Over 950 signs have been removed and the work has just begun.

A WPA property survey is being started in Glynn County on which to base the final zoning for that county. This survey, when completed, will make it possible also to have the returns of property made with equitable assessments and is expected to more than repay the cost of the survey to the county. In Chatham County one month of work on the survey paid for the county's cost of the entire survey as so much new assessable property was recorded and so many improvements noted that placed the property in a higher taxable bracket. It is reported that one piece of property in one Georgia county that had carried an assessment of $50 for many years was shown to have an actual assessable value of $2,500.00.

The United States Army has fourteen air maps of Glynn County which have been reduced to a single map to scale of one inch to a mile for use in zoning and for the master plan of the county as well as for the Coastal Highway planning studies. Later similar reductions will be prepared for each of the counties. Glynn County has been used largely as the initial unit for the work as the Glynn County Engineer, H. J. Friedman, is also Engineer for the Coastal Highway District. We are indebted to him for the interview making this article possible.

Southeastern Sales Co. To Represent Ransome

The Southeastern Sales Co. of Harlan, Ky., has just been appointed distributor for Ransome concrete mixers and pavers in a large section of the state of Kentucky by the Ransome Concrete Machinery Co., of Dunellen, N.J.

New Barber-Greene Dealers

The following companies have been appointed distributors in their respective territories by the Barber-Greene Co., Aurora, Ill.: A. R. Amos, Jr., Commercial Trust Bldg., Philadelphia, Pa.; Columbia Equipment Co., Portland, Ore., with branches in Spokane and Seattle, Wash., Baker, Ore., and Boise, Idaho; A. E. Hunt, 1115 Burnaby St., Vancouver, B. C., Canada; J. Shuman Hower, 85 No. Genesee St., Utica, N. Y.; and W. T. Jones Co., Dooly Bldg., Salt Lake City, for equipment purchased by manufacturers. The Lund Machinery Co. will continue to handle Barber-Greene road-building equipment in this territory.

E. F. Lamprey, for many years with the Barber-Greene Co. and for the past few years sales manager of a machinery house in the Boston territory, has rejoined the Barber-Greene sales organization and will be located in the Boston Office at 84 Rogers St., Cambridge. W. B. Holder is Eastern Sales Manager.

Concrete VIBRATORS
AND GRINDERS
Write for Circular on types, sizes and prices
White Mfg. Co.
ELKHART INDIANA

IMPROVED! NEW! NO GRIT! NO WEAR!

FRENCH & HECHT WHEELBARROW WHEEL with NU-SEAL

Here's the wheel you've been waiting for—a sturdy, free-running Timken bearing wheel with Nu-Seal, to positively exclude destructive abrasives—sand, dust, grit. It will "stand the gaff."

Ideal for Contractors, Cement Makers, Foundries, Brick Yards, Etc.

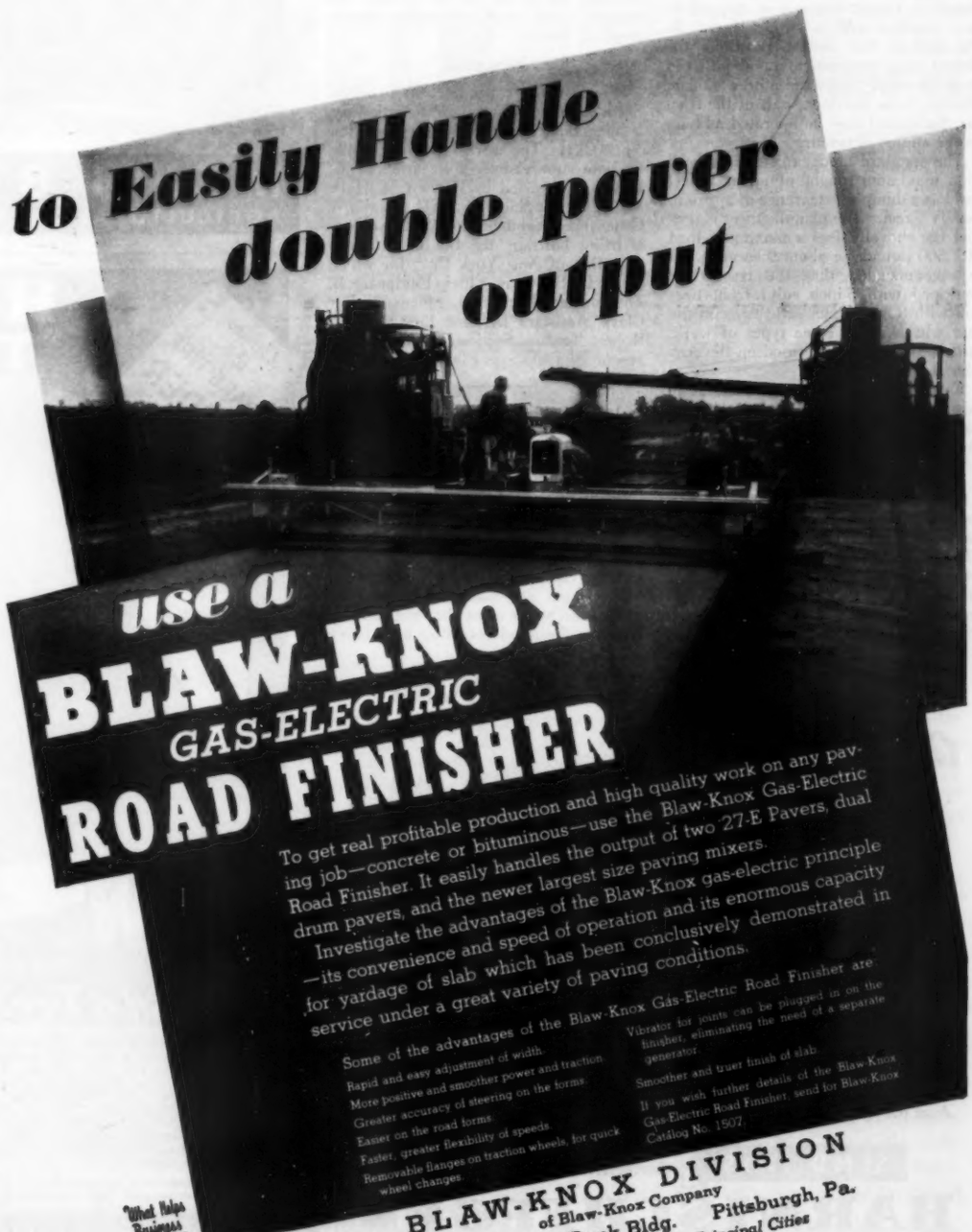
Nu-Seal is an ingenious, inexpensive but POSITIVE means for keeping in the grease and keeping out the grit. These field-tested, practical wheels will outlast anything you've seen to date because WEAR from foreign matter has been eliminated. Their longer life will return your initial investment over and over.

No need to tell you about the benefits of air-tired barrow wheels. Add the wear-free protection of Nu-Seal and you are efficiently equipped for a long time to come. Available in sizes for 4.00 x 8" or 4.00 x 12" tires. We will supply the wheel separately from the tires if so desired.

NU-SEAL
Is simple—POSITIVE—Inexpensive. Keeps the Grease In—the Grit out.

Write for Descriptive Bulletin 60 and Prices

FRENCH & HECHT, DAVENPORT, IOWA SPRINGFIELD, OHIO
WHEEL BUILDERS SINCE 1888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double paver
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use a
BLAW-KNOX
GAS-ELECTRIC
ROAD FINISHER
To get real profitable production and high quality work on any paving job—concrete or bituminous—use the Blaw-Knox Gas-Electric Road Finisher. It easily handles the output of two 27-E Pavers, dual drum pavers, and the newer largest size paving mixers.
Investigate the advantages of the Blaw-Knox gas-electric principle —its convenience and speed of operation and its enormous capacity for yardage of slab which has been conclusively demonstrated in service under a great variety of paving conditions.
Some of the advantages of the Blaw-Knox Gas-Electric Road Finisher are:
Rapid and easy adjustment of width.
More positive and smoother power and traction.
Greater accuracy of steering on the forms.
Easier on the road forms.
Faster, greater flexibility of speeds.
Removable flanges on traction wheels, for quick wheel changes.
Vibrator for joints can be plugged in on the finisher, eliminating the need of a separate generator.
Smoother and truer finish of slab.
If you wish further details of the Blaw-Knox Gas-Electric Road Finisher, send for Blaw-Knox Catalog No. 1507.
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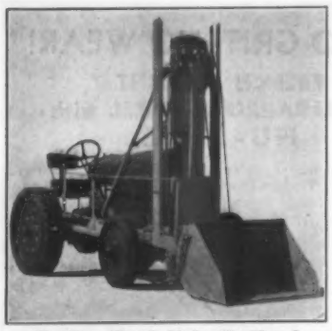


The New Hough Hydraulic Shovel

Hydraulic Shovels For Tractor Mounting

Hough hydraulic shovels for material handling, made by the Frank G. Hough Co., 919 No. Michigan Ave., Chicago, Ill., are designed for use on International I-12, I-20 and I-30 or Case CI industrial tractors.

These shovels, which have a ½-yard bucket, are hydraulically operated, the piston being actuated smoothly by a rotary-vane-type pump directly connected to the tractor engine crankshaft. The shovel is raised, lowered or stopped in any position with a single lever. In the highest and lowest positions the shovel stops automatically. A pull rod trips the load. Since the power is taken directly from the crankshaft of the tractor, the shovel may be operated as long as the engine is running.

The standard model raises the shovel to a maximum height of about 9 feet and has a dumping clearance of approximately 7 feet. The manufacturer claims that the shovel raises a maximum load of 1,500 pounds in about 9 seconds. It is recommended that the tractor be equipped with 5-inch solid front tires and with 8 or 10-inch solid tires on the rear wheels. For some types of work, pneumatic tires can be used on the rear wheels.

Form 108 describing and illustrating this Hough hydraulic shovel may be secured by those interested direct from the manufacturer.

Total construction activity of all types, including new construction and maintenance, reached a peak of approximately $14,000,000,000 in 1927, declined to $4,000,000,000 in 1933 and in 1937 advanced to about $8,000,000,000, according to a recent study by the Bureau of Foreign and Domestic Commerce.

Problems of Open-Cut Excavation for Subway

(*Continued from page 23*)

excavation in this open cut without the need of rubber boots or even of rubbers.

A 6-inch open tile drain laid in gravel leading to sumps takes care of the water to relieve the pressure head during the installation of the bottom concrete.

Excavation

All excavation of this job was handled by the fleet of crawler and truck-mounted cranes with ¾-yard clamshell buckets, by hand loading of skips, and by the moving of material within the excavation by the tractor and bulldozer for final removal by the clamshells. The contractor's crane equipment consists of one Universal on a Mack truck, one crawler-mounted Speedcrane, two Lorain 77's and one Lorain 40 on crawlers and one Bucyrus-Erie crane.

Where rock was encountered and light blasting used, all shots were covered with wire rope mats. Similar mats were placed on the decking when rock was brought up so as not to damage the decking with rock dropped thereon, awaiting trucks.

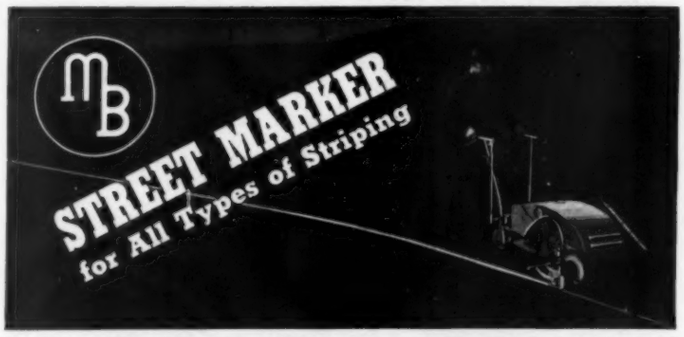
Personnel

The contractor for Section 6 of the Sixth Avenue Subway, New York City, is Spencer, White & Prentis, Inc., of New York City. The work is under the immediate supervision of Lazarus White, President, assisted by Herbert M. Hale, Managing Engineer, and H. Pagliaro, General Superintendent. This subway is being built by the Board of Transportation of New York City, for which Jesse B. Snow is Chief Engineer, B. Toughtaling, Division Engineer, Arthur Clark, Assistant Division Engineer and Robert Taylor, Section Engineer, with Joseph Shanahan as Field Engineer.

Safe Highways

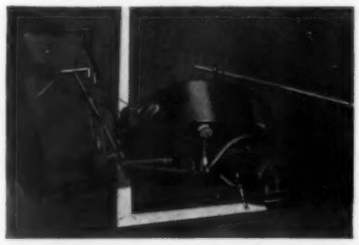
Speaking on highway safety at the Award Dinner for the national traffic safety contest of the National Safety Council, Secretary of Agriculture Wallace said, in part:

"We have a two-fold task—to rebuild highways as nearly accident-proof as possible as rapidly as we can afford where these are badly overloaded by traffic, and at the same time not to overlook the thousands of miles of existing highways which must certainly continue into the distant future to carry a large part of our nation's travel. Much can be done to make these safely usable through the application of ingenious and intelligent engineering, persistent and comprehensive education, courteous, impartial, effective enforcement."



WELL MARKED STREETS PROMOTE SAFETY!

Here's a new, all-purpose, self-propelling marker that's equally effective for striping, centerlines (single or double), diagonal or parallel parking, cross walks, safety zones, etc. Paint or hot asphalt. Steady pressure. Variable speed. Exhaust blower and combination spray and brush assures clean, well-defined lines with no drippings or splashed edges.



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Easy, one-man, motorcycle-grip control for painting, steering and speed. No compressor required. Low cost. Practically no upkeep. Built by old, established concern with 12 years' experience building road markers. Write for further data.

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AGRICULTURAL and INDUSTRIAL EQUIPMENT
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HERCULES "TIRE PACK" Dump Body

Carries the SPARE TIRE UNDER THE BODY

Burglar Proof
Dirt Proof
Weather Proof

Compartment for Tools Flares Shovels

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8 - FT. BODIES CAN BE CARRIED ON SHORT WHEEL BASE TRUCKS-

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Hercules scores again. Now it's the "Tool and Tire Pack"—the most modern dumping unit for 1½ and 2 ton trucks. Length 8 ft. Capacities 2 or 2½ yds.—with perfect load distribution. Has side braces, heavy rub rails. UNDER BODY TIRE AND TOOL COMPARTMENTS—theft and weather proof. No extra mounting height. This body with Super Power "Center-Lift" hoists available through Hercules only.

Manufacturers of a complete line of hoists and dump bodies for both light and heavy duty trucks.

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DO YOUR OWN REPAIR WORK— anywhere!

You can hook this trailer welder behind your car or truck—travel fast to the job. It's mounted on cantilever springs and balloon tires—protected against road shocks.

P&H-HANSEN TRAILER WELDER

Gives you 150-ampere capacity for a wide range of welding work in maintenance, erecting structural steels, etc. Powered by small, air-cooled gas engine. Has remarkable electrical efficiency. A low-cost unit that quickly pays for itself. Ask about it.

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☐ Please send Bulletin W-6, describing the 150-Amp. Trailer Welder.

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The New Jaeger Light-Weight Self-Priming Pump

New Automatic Priming Aluminum Alloy Pumps

The new Bantam automatic priming pump, recently announced by the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio, is built of aluminum alloy, weighs only 52 pounds and has a rated capacity of 5,200 gallons an hour. The priming action, employing the Jaeger patented priming jet, insures fast self-priming at lifts up to 25 feet, according to the manufacturer.

Including the standard ¾ to 1-hp ball-bearing engine with carburetor and gasoline tank of 0.4-gallon capacity, the Bantam measures 9½ x 19 inches and can easily be carried by a boy or shoved into the front or back of an automobile. It is also furnished with a ½-hp splash-proof electric motor which may be plugged into any light socket.

Shovel Takes to Air On Steel Erection Job

On a recent bridge construction job in Garvin County, Okla., a P & H Model 150 Bantam Weight nonchalantly perched some 40-odd feet up in the air on apparently scant support furnished the local residents a kind of "Believe It or Not" for a topic of conversation.

Owned by the Ottinger Construction Co. of Hinton, Okla., this Bantam Weight, under the direction of J. B. Highfill, Resident Construction Engineer of the State Highway Commission, was rigged as a traveler to aid in the erection of a 180-foot riveted truss and three 60-foot I beams. Working as sure-footedly as if it were on the ground, the machine was mounted on I-beam sections, placed at right angles to horizontal structural members. Two lengths of 6-inch pipe were used as rollers. With a 40-foot crane boom, the machine easily handled maximum loads up to 10 tons.

Approximately 100,000 cubic yards of loam will be required for the growing area on Treasure Island, San Francisco Bay site of the 1939 Golden Gate International Exposition. The top soil will be barged to the Exposition site from Bethel Island, a distance of 30 miles.

South Bend

BITUMINOUS MATERIAL DISTRIBUTOR

Purchased by Truman L. Fisit, Springfield, Illinois

1908—Thirty Years' Experience—1938

MUNICIPAL SUPPLY COMPANY
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TWO-WAY POWER

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BURCH

DUMP BODIES and

Hoists

Equal power—up or down. Locks automatically, any position. One moving part—no exposed working parts—no gears—no oil lines—that's the Burch Hydromotor. Bodies are equally noteworthy.

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THE BURCH CORPORATION
CRESTLINE, OHIO

CHECK these advantages of

Franklin AIRCOOLED

INDUSTRIAL POWER UNITS

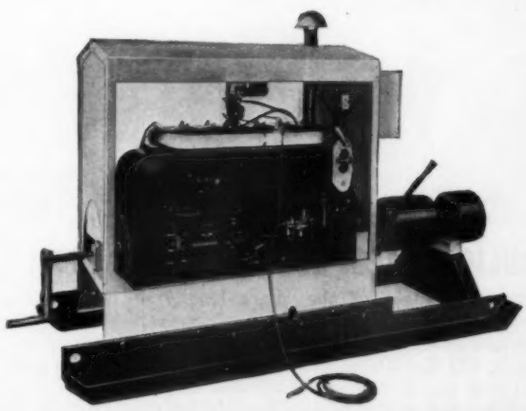
against your present power costs. They give you *some* reasons for the construction industry's rapidly growing appreciation of the inherent economy of air cooled engines for industrial use.

LOW OPERATING COST

Greater *positive* fuel economy is assured because of the air cooled engine's highly efficient cooling system which enables it to quickly develop more efficient and constant operating temperatures. Accurate field records show gasoline savings up to 30% over water-cooled types of power.

LOW MAINTENANCE COST

In an air cooled engine, the expense of maintaining radiator, water pump, hose, fan belt and other plumbing fixtures is entirely eliminated. An air cooled engine is easily serviced by any good mechanic familiar with ordinary water cooled engine practice. Its extremely simple construction and easy-access design makes for economical maintenance. For example, its individual cylinder construction alone effects radical savings in time, labor and expense.



● An air cooled engine is an all-weather engine because it will not freeze in zero weather, boil or overheat in extreme heat or high altitudes, —and *requires no anti-freeze*. Frozen and cracked engine blocks are a thing of the past, —constant draining and refilling is no longer required,—nor is it necessary to locate your unit close to a water supply.

● An air cooled engine weighs less because it has no radiator, plumbing system or water. The use of aluminum alloy in cylinder heads and other mechanical parts adds to its lighter weight without any sacrifice of ruggedness. In trucks, especially, this saving in weight is important because it allows for greater pay load.

If your problem is one of power for road machinery, trucks, industrial equipment, agricultural machinery, saw mills, compressors, pumps or other industrial use,—*write for Bulletin No. 9E* and learn how you can cut your power costs.

AIR COOLED MOTORS CORPORATION

Executive Offices • 515 MADISON AVENUE NEW YORK, N. Y. Factory • SYRACUSE, N. Y.

The New Hobart Multi-Range Arc Welder

Wide Welding Range On New Arc Welders

The new line of Multi-Range arc welders recently announced by Hobart Bros. Co., Box CE-28, Troy, Ohio, has a thousand available combinations of voltage and welding current, according to the manufacturer. These new models embody the same principles of control as previous models but the wide welding range of each machine is divided into ten ranges with a 100-step continuously wound rheostat, known as a Volt-Amp Adjuster, operating in each range. The result is claimed to be a complete absence of dead spots, closer control of the relationship between open circuit voltage and welding current, and smoothness of operation.

Another feature of these units is the Hobart remote control. The Volt-Amp Adjuster is located compactly within the ten-range dial so it can easily be removed, thus providing the operator with finger tip control, regardless of the distance he is working from the machine. An ordinary lamp cord extension places the Volt-Amp Adjuster close to the operator wherever he may be working.

The welding ranges are easily selected by turning a large hand wheel of steel covered with hard rubber, conveniently located on the front of the turret-top control cabinet, while the indicating dials are clearly marked in black, red and silver. Separate voltmeter and ammeter are also provided, flush mounted on the front panel.

These Multi-Range arc welders are now available in Junior models with built-in electric motors in 100 and 150-ampere ratings or with self-starting gasoline engines in 200-ampere rating. The Senior models include 150, 200, 300, 400 and 600-ampere electric-drive, 200, 300, 400 and 600-ampere gasoline-engine-drive and 200, 300 and 400-ampere generators only for connection to the purchaser's own gasoline engine or electric motor.

Heavy-Duty Trailers Have Equalizing Brakes

The new equalizing system of brakes recently announced by the Rogers Bros. Corp., 108 Orchard St., Albion, Pa., for its line of heavy-duty trailers for the transportation of machinery or materials is claimed by the manufacturer to eliminate the possibility of brake "grab" or "walk." This brake system utilizes compensating levers which give and take as the axles oscillate. The control rods are, therefore, kept constantly in proper tension for instant application and release of the brakes under all conditions. Power is applied with the accepted air or vacuum units.

Rogers Bros. claims that this improvement affords new braking dependability and safety, permitting hauling heavier loads at higher speeds than were formerly possible.

New Oil Filter For Gas Engines

The N-Type Purolator, made by Motor Improvements, Inc., Newark, N. J., is designed to keep the oil in gasoline engines free of dirt and abrasives. This is accomplished by a filter which removes all foreign matter from the oil, no matter how finely divided it may be, according to the manufacturer. N-Type filtration is entirely mechanical, with no addition of chemicals or changes in the oil.

The unit consists of an outer case or container, inside of which is a replaceable filtering unit or cartridge. This fits into the outer case in such a manner as to form a seal to prevent unfiltered oil getting into the outlet of the Purolator. The dirty oil is forced into the case and up through a central tube running through the center of the element. It then passes into the oil distributing chamber which distributes the oil evenly throughout the filtering medium. As the oil passes through this absorption type filter, all carbon is absorbed and sludge, dirt and abrasives are trapped.

The Purolator, which is provided in two sizes, one for engines with crankcase capacities of 6 quarts or less and one for engines with 7 to 10-quart crankcase capacities, is described and illustrated in literature which may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
Write for Job Estimate and Literature
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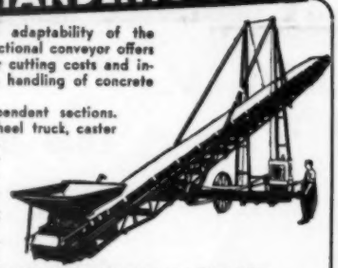
NEW WAYS TO CUT MATERIALS HANDLING COSTS

The flexibility and adaptability of the Porte "Model 347" sectional conveyor offers wide opportunities for cutting costs and increasing profit in the handling of concrete and aggregates.
Made up of independent sections.
Can be used on wheel truck, caster mounting or on supports as permanent or semi-permanent conveyor. Easily disassembled, easily transported, easily reassembled. Our catalog describes our complete line of portable, sectional, and permanent conveyors designed to suit every contractor's requirement.



A. B. FARQUHAR CO., LIMITED, Portable Machinery Division
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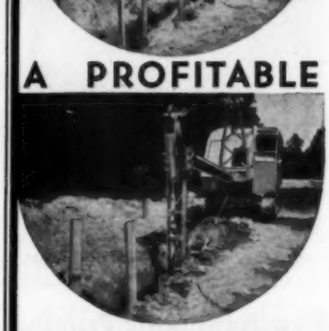
A PROFITABLE



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EVERY DAY

Excavating machinery pays its owner in proportion to its workability—adaptability and stamina—but most of all because of the way it "handles". Operators soon become expert in handling the Clipper—its action in response to the Vacuum Control Levers is positive, accurate and dependable.

Buckeye Clipper CONVERTIBLE EXCAVATORS with "MEVAC" METERED VACUUM CONTROL
1/2 Yd. 5/8 Yd. 3/4 Yd.
THE BUCKEYE TRACTION DITCHER CO.
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HEIL Quality PRODUCTS
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Here are the advantages of the guaranteed Heil Dig-N-Carry hydraulic system (1) Positive hydraulic power raises and lowers bowl—raises and lowers front apron—moves unloading apron forward and back; (2) No cables, cams or sheaves to break or get out of order; (3) Fast tractor hitch and unhitch—Guaranteed hydraulic operation is only *ONE* of *MANY* Heil Dig-N-Carry features—*NOW* is the time to investigate—Address:

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N. B. A two dollar bill, check or postage stamps will be entirely acceptable.

Second Lincoln Tube Holed Through Early

While motorists are using the completed south tube of the Lincoln Tunnel connecting mid-town Manhattan with New Jersey, the north tube has been pushed through the silt underlying the Hudson River and was holed through early last month, weeks ahead of schedule.

On the Manhattan side all excavation work has been finished, beginning at a shaft sunk in West 39th Street and Twelfth Avenue and continuing to the caisson in the Hudson River at the foot of West 39th Street. This portion of the north tube was dug through rock and silt. The cutting shield was dismantled upon reaching the caisson where holing through took place when the shield from Weehawken, N. J., arrived.

The two tubes are only 60 feet apart on the Jersey side and 75 feet apart as they extend beneath the river. In Manhattan the south tube swings away to its plaza between Ninth and Tenth Avenues, 38th and 39th Streets. The plaza of the north tunnel will be located between Tenth and Eleventh Avenues, 39th and 40th Streets. The existence of the two separate plazas has made it possible to carry on the construction of the north tube without interference to the traffic now using the south tube.

The date for the completion of all work required for the ultimate plan of the Lincoln Tunnel was recently advanced to 1940.

New Welding Electrodes

Three new arc welding electrodes, each protected by a heavy extruded coating, have been announced by the General Electric Co., Schenectady, N. Y. These electrodes are intended for shielded arc welding of mild steel.

Type W-20E is designed especially for general purpose single or multiple-pass arc welding of mild steel and can be used with alternating or direct current. Type W-22E for high-quality single or multiple-pass arc welding is especially recommended for use with direct current on vertical and overhead welding jobs. Type W-23E is designed primarily for welding of mild steel in the flat position and can be used with either alternating or direct current.

BEFORE and AFTER

MARION, IND.

Adopted

STANOLIND CUT-BACK ASPHALT

Increased property values, happier home owners, safe, dustless streets are just some of the direct benefits that resulted when Marion, Indiana, adopted asphalt streets.

The program of street renewal followed in Marion is a credit to the city administration. Adequate streets at low cost were the first consideration.

A municipally owned plant pre-mixes the asphalt for surfacing. Aggregate is produced locally.

Various specifications for mixing and laying make it possible to produce street surfaces to meet all traffic requirements with the greatest economy of material. As a result, property owners and motorists alike acclaim the improvement that this program has brought.

A Standard Asphalt representative has specifications and an approximate estimate on all types of asphalt street and highway construction. Let him help you work out an economical road building and maintenance program with Standard Asphalt products. Call him at your local Standard Oil Office or write 910 S. Michigan Avenue, Chicago, Illinois.

Asphalt for every purpose

STANDARD OIL COMPANY

(INDIANA)

The New Barber-Greene Junior Bucket Loader

New Bucket Loader Is Self-Feeding

A new full crawler-mounted high-capacity self-feeding loader to be known as the Model 552 has just been announced by the Barber-Greene Co., 485 W. Park Ave., Aurora, Ill. This new bucket loader operates continuously, giving a steady flow of material. Its spirals are self-feeding and its operation simple.

Being crawler-mounted, the loader can be moved quickly from one set-up to another and its boom may be laid back for low traveling clearance when traveling longer distances. Other features of this new unit include the tank-type chassis frame, synchronized spiral feed, automatic overload release, optional high traveling speed or slow crowding speed, and the B-G patented floating boom principle.

Complete information on this Junior bucket loader, which is designed for light work such as loading sand, gravel, crushed stone or similar materials from ground storage to trucks, may be secured direct from the manufacturer.

New Browning Crane Dealers

The Murray Construction Equipment Co., 1166 Elk St., Buffalo, N.Y., and the Nicoll-Talcott Corp., 449 Wethersfield Ave., Hartford, Conn., have recently been appointed distributors in their respective territories for the complete line of excavating equipment made by the Browning Crane & Shovel Co., Cleveland, Ohio.

Road-Mix Methods On Vermont Highway

(*Continued on page* 19)

roadway. On the same day as the mixing the contractor put on a 5-ton Buffalo-Springfield roller which was kept about 6 inches from the edge of the mixed material to keep from breaking down the edge. The rolling was continued the following day and then followed by a 10-ton Buffalo-Springfield steam roller.

Two days later washed sand was hand-spread over the surface of the road at the rate of 50 cubic yards per mile and hand-broomed to fill the surface voids. Traffic was permitted to whip off any excess sand.

The tack coat was protected by a hand-cast covering of sand to prevent its being picked up by traffic during curing. During rolling of the material after mixing, the rolls of the machines were wet with kerosene to prevent sticking. This treatment of the rolls was not necessary after the second day.

Only the amount of material that could be mixed during the day was laid out for work so that each day the contractor was starting a new stretch of material. This made it necessary to protect the material already mixed and rolled and heavy paper was spread to prevent too much tar being applied at the start of the application.

The Seal Coat

A seal coat of hot A tar was applied at 0.30 gallon per square yard about 500 feet at a time. During this operation traffic was held up. A Burch Chip-It-Over spreader with self-power was attached to a truck and the truck backed over the surface down the middle of the road to spread the pea stone uniformly. This was followed by a second truck with two men who hand-cast material down the edges not reached by the first machine. The pea stone was applied at the rate of 20 cubic yards per 1,000 feet of road. The specifications on aggregate for the mix called for 25 to 40 per cent of pea stone from ¼ to ¾ inch. It was found that the larger quantity did the work much better than the smaller amount.

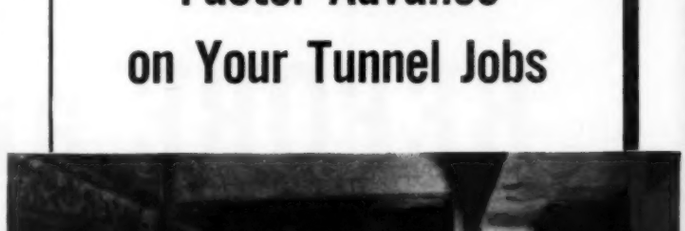
The pea stone for sealing was broomed by hand to a uniform distribution and then the two rollers, the 5-ton and the 10-ton, followed close behind the men to roll the pea stone into the surface as quickly as possible.

Personnel

This contract, FAP 111-E, was completed by Charles E. Horne of Millbury, Mass., with his son, Roger B. Horne, as Superintendent. For the Vermont Department of Highways, Vail O. Leach was Resident Engineer. Hubert E. Sargent is Commissioner of Highways and Chief Engineer of the Department. The contract for the job was $122,651.10. A total of 85,000 gallons of tar, 5,700 tons of aggregate and 600 tons of seal stone were used.

An article on Missouri's method of raising low concrete slabs by mud-pumping and data on costs will appear in our July issue.

Faster Advance on Your Tunnel Jobs



GARDNER-DENVER MINE CAR LOADER

Here's the fastest, most economical way to handle broken rock—the *surest* way to get rapid progress at your headings. GD-9 Mine Car Loader operates on compressed air—uses only as much air as an ordinary drill—18 to 24 inch gauge track. Save time, labor and money with the GD-9 Mine Car Loader . . . write for bulletin giving complete information. GARDNER-DENVER COMPANY, Quincy, Illinois.

Since 1859

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10-ton Motor Roller

A rugged six-cylinder, multiple-speed roller suitable for any rolling service under any conditions; negotiates the most difficult grades.

Available attachments include the "Tru-Plane" high compression and smoothing roll, scarifier, self-starter, electric lighting equipment, leveling blade and sprinkling attachments.

Complete range of sizes—Write for bulletins

THE HUBER MANUFACTURING CO.
MARION, OHIO

HOTEL CHELSEA RIGHT ON THE BOARDWALK

FOR RECREATION OR RELAXATION

Choose the Chelsea

Here you will find everything to further your comfort and enjoyment — outside ocean-view rooms . . . wide verandas for lounging . . . sun deck . . . beautiful dining room at the ocean's edge . . . superb cuisine . . . varied sports and entertainment. You'll like your fellow guests, too, and the delightfully friendly atmosphere of the Chelsea.

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FROM $6 WITH MEALS & BATH

$3 ROOM ONLY & BATH Per Person 2 in a Room

ATLANTIC CITY

JOEL HILLMAN • J. CHRISTIAN MYERS • JULIAN A. HILLMAN

Among the Manufacturers

Carnegie-Illinois Steel Corp., Pittsburgh, Pa., has announced the appointment of William P. Andrews as Manager of Sales for the Cincinnati District to succeed Lawrence K. Slaback who died recently. Mr. Andrews has been associated with U. S. Steel subsidiaries for 17 years.

Dodge Division of the Chrysler Corp., Detroit, Mich., recently lost its newly appointed General Sales Manager, W. M. Purves, who died suddenly on his way to the Pacific Coast. Mr. Purves had been associated with the Dodge organization since 1924.

The Foote Co., Nunda, N. Y., has appointed F. M. ("Fritz") Awalt as Pacific Coast District Sales Manager to handle sales of MultiFoote concrete pavers and Adnun black-top pavers and spreaders in the ten western states. Mr. Awalt has previously been associated with the Waukesha Motor Co., and Northwest Engineering Co.

The Independent Pneumatic Tool Co., Chicago, Ill., has opened a new sales-service branch at 6200 E. Slauson Ave., Los Angeles, Calif. B. J. Herron is in charge.

The Koppers Co., Pittsburgh, Pa., has elected K. R. Burke, General Superintendent of the Tar and Chemical Division, a Vice President of the company. Mr. Burke, who was formerly with the American Tar Products Co., has held his present position with Koppers since 1928.

Le Roi Co., Milwaukee, Wis., has recently increased the size of its Milwaukee plant by 25,000 square feet of floor space, providing for a new production machine line to handle certain sizes of cylinder blocks and cylinder heads, a display room and additional storage space for its line of engines and air compressors.

Mack-International Motor Truck Corp., Long Island City, N.Y., has announced the election of F. F. Staniford as President and R. D. Hilty as Vice President of the corporation. Mr. Staniford, who has been associated with the company since 1911, succeeds the late W. R. Edson. Mr. Hilty will have charge of all export sales and will assist in the establishing of domestic dealer organizations.

Union Metal Mfg. Co., Canton, Ohio, recently purchased the Burton Mfg. Co., formerly at Michigan City, Ind., manufacturer of seamless steel structural tubing. E. B. Rogers, former President of Burton, is now associated with Union Metal in charge of tubing operations.

Gar Wood Industries, Inc., Detroit, Mich., announced recently a profit-sharing plan whereby Gar Wood employees will receive 20 per cent of all declared profits. Gar Wood, by his own choice, has reduced his personal salary 50 per cent.

Truck Shovels, Cranes Feature Air Control

Among the features of Michigan truck shovels and cranes, made by the Michigan Power Shovel Co., Benton Harbor, Mich., is the air-controlled mechanism by which finger-tip air clutches operate positively and smoothly.

The turntable mechanism is stabilized by ball-bearing top and hook rollers, relieving the center pintle from all strain. Shafts and drums turn on anti-friction roller and ball bearings. Manten high-tensile alloy steel is used in the 13-inch chassis frame. The overall width is 7 feet 11 inches, the height 8 feet 9 inches to the top mast and the overall length 205 inches. The crane boom can be furnished in lengths up to 40 feet with a jib extension if desired, and the dipper capacity of the shovel is ⅜ yard.

Power is furnished by a heavy-duty 6-cylinder engine which supplies the motive power for the truck as well as for the shovel, developing 57 hp at 1,800 rpm. Another feature of this unit is the Lockheed hydraulic brakes with a safety vacuum reservoir, and a separate emergency brake on the drive shaft. The turntable is equipped with a positive lock within reach of the operator. The boom hoist clutch is equipped with a safety pawl and powerful brake for complete boom control at all times.

A complete description of this mobile unit, which can travel along the highway at 25 miles an hour, as well as a number of action photographs showing Michigan truck shovels and cranes in use on road jobs, bridge construction, snow removal and a variety of other work, is contained in literature which may be secured direct from the manufacturer.

New Hercules Co. Dealers

The Hercules Co., Marion, Ohio, has announced the appointment of the following companies to handle the sales of Hercules road rollers and Ironerolls in their respective territories: Berry & Brown, Marianna, Fla.; Drott Tractor Co., Iron River, Mich.; Jenison Machinery Co., San Francisco, Calif.; George Malvese & Co., New Hyde Park, L.I., N.Y.; and Orange State Motor Co., Tampa, Fla.

Assistant Sales Manager Wanted

An Assistant Sales Manager is being sought by a manufacturing company making and selling machinery used in construction work. Annual business approximately $3,000,000. Desire man in middle thirties with good education preferably along engineering lines. Must have had selling experience and background in construction or some similar industry. Possibility of developing into head of business. Applications should be accompanied by record of education, experience, references and whether employed at the present time. Address Box 207, Contractors and Engineers Monthly, 470 Fourth Avenue, New York, N.Y.

WILLIAMS Buckets

Built to Last . . . and Move Dirt Fast!

No "dead-head" metal rides in Williams Buckets—you swing pay loads, not inert metal! The special welded construction of Williams Buckets eliminates excess weight—makes them stronger, and more enduring. Williams Buckets are powerful diggers. They bite full loads smoothly and easily, open quickly and dump cleanly. A Williams Bucket can play a big part in making excavating or material handling more profitable.

The Williams Line Includes Power-Arm, Multiple Rope Power Wheel, Single Line Hook-on and Dragline Bucket.

Distributors located in all parts of the country are competent to render valuable field service.

Tell us the condition, and we'll send you FREE, a special bulletin describing the specific Williams Bucket best fitted to the job.

THE WELLMAN ENGINEERING COMPANY
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MORE MIXER FOR YOUR MONEY!

GET REX NEW LOW PRICES!

Now Rex Mixers come to you at the lowest price in years—to make their use an even greater economy over old-fashioned, outmoded mixing equipment! Not only lower in first cost, they are lower in operating cost to give more yards mixed over long years of economical service.
Built in sizes 3½-S to 14-S; available on any of several types of mountings.
Send for bulletins and prices on the sizes in which you are interested. Address the Chain Belt Company, 1666 W. Bruce Street, Milwaukee, Wisconsin.

REX CHAIN BELT COMPANY of Milwaukee MIXERS

NOVO

Hoists

Builders and Dragline

The most complete and up-to-date line of Hoists up to 60 H. P. on the market.

Here are the reasons—

Smooth Action—double cone friction blocks give a double friction area.

Easy Control—with the Novo screw thrust.

Self-energizing Brakes—The drop of the load helps set the brakes.

Silent Chain Drive—on all Hoists above 30 H. P.

Super strength built into all Hoists by the use of a high steel content nickel alloy in frames, drums, gears and shafts.

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Bulletins and Pamphlets

For free distribution to contractors, engineers and officials. Write for the catalogs you need.

New Diesel Engines

661 The new line of General Motors diesel engines, known as Packaged Power and now available in 2, 3, 4 and 6-cylinder models, to provide economical and efficient power for a variety of services, is described in a new illustrated booklet which may be secured by those interested direct from the General Motors Sales Corp., Diesel Engine Division, Cleveland, Ohio.

Pile-Driving Hammers

662 Union pile-driving hammers of one-piece frame construction, as well as complete pile-driving plants, are described and illustrated in bulletins which the Union Iron Works, Inc., P. O. Box 18, Elizabeth, N. J., will send on request.

Hydraulic-Lift Bulldozers

663 Baker direct-lift bulldozers and Gradebuilders, operated hydraulically, are described in literature which the Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill., will be glad to send on request.

Highway-Widening Machine

664 Complete information on the Buckeye highway-widening machine, in two models for cuts of 12 to 27 inches and 12 to 48 inches in width, respectively, for preparing the subgrade in highway widening work, may be secured from the Buckeye Traction Ditcher Co., Findlay, Ohio.

Black-Top Pavers

665 A new catalog describing the construction and operating features of the Jaeger road paver for hot or cold bituminous mixes, stone, or macadam, which is adjustable in 9 to 14-foot widths, may be secured by interested contractors and engineers from the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio.

New Portable Asphalt Plants

666 Literature describing the Cummer Series 1200 asphalt plant for hot and cold mix and the Series 920 plant for hot mix, both of which are completely portable and available with 1, 1½ and 2-ton mixer, may be secured direct from the F. D. Cummer & Son Co., 17th and Euclid Ave., Cleveland, Ohio.

Portable Air Tools

667 Worthington Pump & Machinery Corp., Harrison, N. J., will be glad to send to interested contractors and engineers complete information on the Worthington line of portable air compressors and pneumatic tools, including rock hammers, pavement breakers, clay diggers, trench diggers and tampers.

Rugged Construction Equipment

668 Sterling hoists and pumps for construction jobs, features of which are their simplicity, rugged construction and dependability, are described in literature which the Sterling Machinery Corp., 411-13 Southwest Blvd., Kansas City, Mo., will be glad to send on request.

Modern Bridge Flooring

669 Blaw Knox-Irving bridge decking, which is an open steel mat for use without fill of any kind, thereby providing a modern lightweight and non-skid bridge floor, is described in literature which interested contractors and engineers may secure direct from the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa.

New Portable Service Station

670 Complete information on the new Alemite portable service station for furnishing power lubrication right on the job whenever and wherever it is needed may be secured by those interested direct from the Alemite Division, Stewart-Warner Corp., 1850 Diversey Parkway, Chicago, Ill.

Shovels in All Sizes

671 Bay City Shovels, Inc., Bay City, Mich., will be glad to send to those interested complete information on its line of Bay City shovels, cranes, and draglines in 12 sizes from ⅜ to 1¼-yard capacities as well as on its truck-mounted models.

Portable Lighting Plants

672 Katolight portable electric generating plants, with gasoline or diesel power, for furnishing light for night work or electricity for operating portable tools, are described and illustrated in literature which the Kato Engineering Co., Mankato, Minn., will be glad to send on request.

New Tank-Car Heaters

673 Cleaver steam tank-car heaters in portable 2 and 3-car units, which have a number of new features and improvements, are described and illustrated in a new catalog which contractors and state and county engineers may secure direct from the Cleaver-Brooks Co., Milwaukee, Wis.

Posts for Fence or Road Signs

674 Bethlehem steel snow fence posts and posts for highway signs, which are designed for strength and durability, are described in detail in Folder 301, copies of which may be secured from the Bethlehem Steel Co., Bethlehem, Penna., on request.

A New Leaning-Wheel Grader

675 The new Galion 120 leaning-wheel grader for road construction, ditch cutting and similar work, is described and illustrated in Bulletin No. 221, copies of which may be secured by interested contractors, state and county highway engineers direct from the Galion Iron Works & Mfg. Co., Galion, Ohio.

Center-Line Road Marker

676 Literature describing the new M-B Road Marker, a light-weight, compact device easily attached to a motor car or truck for painting center stripe on concrete or bituminous roads may be secured from the Meili-Blumberg Corp., Box C-4, New Holstein, Wis.

Heavy-Duty Truck Jacks

677 Simons Silver King hydraulic jacks, built especially for handling heavy trucks and passenger cars and which are sufficiently sturdy for many industrial uses, are described and illustrated with great detail in a 16-page circular, Form 248, which may be secured from the Simmons Mfg. Co., Ashland, Ohio.

A New Small Scraper

678 "Expect Big Things from This Small Scraper" is the title of a folder describing the newest of all Carryalls, the G6, built to meet the demand for a small scraper requiring less power yet incorporating the features of the larger units, which R. G. LeTourneau, Inc., Peoria, Ill. and Stockton, Calif., will send on request to all interested contractors and state and county highway engineers.

New 6-Inch Pump

679 The new Marlow 6-inch heavy-duty pump, designed for large-capacity jobs such as wellpoint service, unwatering bridge pier holes and similar work, features of which are its compact design, oil seal, capacity of 90,000 gph and automatic priming, is described in Bulletin CEM-38 which Marlow Pumps, Ridgewood, N. J., will send on request.

Centrifugal Pump Units

680 Nelson Jumbo engine-driven centrifugal pump units, mounted on a welded steel base and easily portable, which are particularly adaptable for road jobs, pumping clear or muddy water from trenches or sewers, or for irrigation are described in a circular which may be secured direct from the Nelson Bros. Co., Saginaw, Mich.

Line of Contractors' Trucks

681 Complete information on Dodge motor trucks in sizes and styles to meet the varying requirements of construction jobs may be secured from the Dodge Bros. Division, Chrysler Corp., Detroit, Mich.

Line and Surface Level

682 Sand's Level & Tool Co., 8531 Gratiot Ave., Detroit, Mich., will be glad to send to contractors and engineers complete information on its Sand's-Stevens level, a feature of which is that it is easily and quickly attached and can not be accidentally detached from the line.

Line of Rock Crushers

683 Telsmith rock-crushing equipment to meet the varying crushing requirements of construction jobs is described in Bulletin Q-34, copies of which may be secured direct from the Smith Engineering Works, 4014 N. Holton St., Milwaukee, Wis.

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BULLDOZERS

The preference for Baker Direct Lift Bulldozers and Gradebuilders is easy to explain. Direct, hydraulic lift means fewer wearing parts—no loose joints—fewer delays on the job. There is tremendous down pressure when you need it and rugged strength for the toughest jobs.

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STRENGTH and DURABILITY plus ECONOMY
Made in 12 Models, from 2 to 21 TONS—
TANDEM—3-WHEEL and 3-AXLE TANDEM
GASOLINE OR DIESEL POWERED
Full details will be sent upon request
THE BUFFALO-SPRINGFIELD ROLLER CO
Springfield, Ohio, U. S. A.

Owen
GETS A MOUTHFUL AT EVERY BITE

A ROUND NOSE *for* MORE EFFECTIVE DIGGING

The Type DX bucket has exceptional strength and digging ability. The centers of the lips penetrate with minimum resistance and continue to carve their way into the hard material, assuring a greater load at each grab. There are no corners or square back plates to retard the entrance of material.

THE OWEN BUCKET CO.
6030 Breakwater Ave., Cleveland, Ohio
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.

New Overpass on U. S. 1 Removes Blind Curves

(*Continued from page 26*)

lel to the railroad track where the footings are 10 feet x 6 inches x 19 feet. Sixteen 12-inch, 53-pound H-beams were used for piers 5 and 6. They were all driven through the hard clay into the soft clay and to ledge, using a McKiernan-Terry No. 10-B steam hammer. On the abutment piles where the length was great and the crane in a precarious position a No. 7 hammer was used to start the piles and the larger hammer for the final driving.

Piers 1, 2, 3, 8, 9 and 10 have 4-foot square columns averaging 29 feet in height. Piers 4, 5, 6, and 7, along the railroad track, have collision walls 2 feet 6 inches wide at the ends and 5 feet wide at the center and are 18 feet long. The walls are 6 feet 2 inches high at the ends and 8 feet 8 inches high at the center. These carry columns 3 feet 8 inches square and 11 feet high. The caps on the columns are 4 feet 8 inches square on four of the columns and are 5 feet square on piers 1, 2, 3, 8, 9 and 10.

Girders and Stringers

The stringers are encased I-beams carrying the 7½-inch concrete deck, and 3-inch wearing surface with a crown of 3 inches in 22 feet. The sidewalk slab is 4 inches thick and is underlaid by hollow tile and the curb is 9 inches high. The stringers are reinforced top and bottom with added continuous plates carried through the plate girders across the piers. The stringers are cut at each girder, but stiffener angles connect the webs of abutting stringers. The plate girders are 60½ inches high. For the shorter and intermediate spans the stringers are 33-inch, 125-pound I-beams and for the longest spans 36-inch 150-pound I-beams.

Major Quantities

Item	Quantity
Piles, round wood	2,000 feet
Concrete in abutments	230 cubic yards
Concrete in piers	440 cubic yards
Concrete in roadway and sidewalk slabs and encasement	1,210 cubic yards
Concrete wearing surface	170 cubic yards
Concrete rail	754 linear feet
Cement	3,700 barrels
Reinforcing steel	264,000 pounds
Backfill	350 cubic yards
Fill in approaches	115,000 cubic yards
Gravel base	3,500 cubic yards
Gravel surface	700 cubic yards
Bituminous macadam surfacing	570 cubic yards
Guard rail, approaches	2,250 feet
Steel piles, 53 pounds per foot	2,800 feet
Steel piles, 42 pounds per foot	2,800 feet
Steel pile caps	9,200 pounds
Concrete culvert	260 cubic yards
Loam	1,600 cubic yards
Sodding	1,200 square yards
Excavation, relief ditches	6,000 cubic yards
Excavation, structures	1,000 cubic yards
Excavation, pipe culvert and ditches	300 cubic yards
Seeding	115,000 square feet
Filling relief ditch	4,000 cubic yards
Emulsified asphalt	20,000 gallons
Reinforced concrete pipe, 18-inch	72 feet
Total bid exclusive of steel superstructure	$139,214.84

Construction Details

In order to protect the railroad over which heavy traffic is carried where there was excavation for the pier footings, the tracks were each carried on double 18-inch I-beams. A dispatcher was maintained by the railroad with telephone connection both north and south so that he was notified of the approach of trains before they were in sight.

The forms for the piers were made in half-height panels of 1¼ x 8-inch planed lumber unlined. The studs were 2 x 4's and the wales were double 2 x 4's with Scru ties to hold the forms. These panels were used repeatedly for the various columns. The forms were stripped after 72 hours and the concrete immediately covered with burlap kept wet for 10 days from the time of pouring. Water for curing was provided by a Novo pressure pump taking water from a nearby relief trench.

The hand rails measuring 7 x 7 inches in cross section and 6 feet long were cast in gang molds on the job with four ½-inch round corner bars. The concrete was mixed in a Koehring Dandie 1-bag mixer after the materials had been accurately weighed on a small scale made by the Wheelbarrow Scale Co.

Personnel

The bid for the approach fills and the concrete substructure for WPGH 101-A was a combined bid of the Concrete Construction Co. and the Cerulli Contracting Co., both of Chelsea, Mass. John Gagnon was Superintendent for the contractors. For the State Highway Commission of Maine, C. L. English was Resident Engineer.

Night Accidents Cut By Safety Lighting

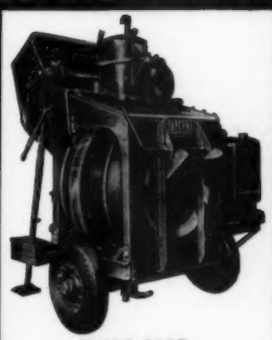
A substantial reduction in night traffic fatalities, serious night injuries and pedestrian accidents during darkness, due to a system of sodium safety lighting along 4 miles of highway between Binghamton and Endicott, N. Y., is revealed by a comparison of accidents recently available for 14-month periods before and after lighting the route and widening from three to four lanes.

Statistics obtained from the State Division of Highways, covering a period from Sept. 1, 1935, through Dec. 31, 1937, show a 67 per cent reduction in night fatalities, a 100 per cent decrease in serious night injuries, a 75 per cent drop in night pedestrian accidents, and a 50 per cent reduction in all night accidents after safety lighting was installed.

In the period studied there were no fatal day accidents either before or after widening the route and no reduction in pedestrian accidents. Serious day injuries, however, were cut 33 per cent and total day accidents 44 per cent.

This system of lighting consists of 10,000-lumen General Electric sodium lamps, mounted in reflectors which direct the maximum light to the road.

BUYING A MIXER?



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- Faster Charging and Discharge Speeds,
- Machined Steel Tracks,
- 2 Wheel Mounting with Timkens and Pneumatics,
- End Discharge Advantages,
- Man-Ten Alloy Steel,

Send for New Catalog, Prices 3½S to 56S Sizes.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

JAEGER

A Maximum Vertical Blade Angle in excess of 80° with the horizontal

Thus a new field of action is opened up for leaning wheel graders . . . thus Galion graders do a wider range of work than heretofore thought possible for a machine of this type.

In addition to offering a maximum vertical blade angle in excess of 80 degrees with the horizontal, this Galion No. 120 leaning wheel grader has extreme adjustments for deep ditch cuts . . . extreme reach to right or left for shoulder cuts, distributing material on new fills, etc. Blade can also be set to cut a 12-inch flat bottom in a ditch.

You will find the Galion No. 120 unequalled in its size and weight class for versatility and capacity. You can now do many different jobs and different types of cuts in rapid succession.

So we invite you to compare this grader point by point with any other grader in the 12-foot class. Send for Bulletin No. 221 which goes into detail.

The Galion Iron Works & Mfg. Co.
Galion Ohio

HELTZEL STEEL ROAD FORMS . . .

Built to meet the most exacting requirements, guaranteed to withstand the punishment of the heaviest sub-grade and finishing machine equipment are two reasons why Heltzel Steel Forms are conceded to be the most sturdy and reliable forms made. Over thirty years of consistent, successful road engineering has proven beyond any question the superior features of these self-aligning, fast-stripping steel forms. After five and six years of continuous, hard use Heltzel Steel Road Forms set as true and strip as easily as new forms.

Bulletin S-19-F describes in detail these Superior Steel Forms. Write today for your copy.

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BUILDS IT BETTER

- BINS, Portable and Stationary
- CEMENT BINS, Portable and Stationary
- CENTRAL MIXING PLANTS
- BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
- BITUMINOUS PAVING FORMS
- ROAD FORMS (with lip curb and integral curb attachments)
- CURB FORMS
- CURB AND GUTTER FORMS
- SIDEWALK FORMS
- SEWER AND TUNNEL FORMS
- SUBGRADE TESTERS
- SUBGRADE PLANERS
- TOOL BOXES
- FINISHING TOOLS FOR CONCRETE ROADS

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO, U.S.A.

Contractors and Engineers Monthly

After Completing the Grading in Coarse Gravel, Charles E. Horne Parked His Lorain 75B Symbolically In Front of the Monument to "The Sleeping Sentinel" (Shown Right) at the Groton, Vt., End of the 5.192-Mile Road-Mix Job. See Page 1.
C. & E. M. Photos

An Increasing Number of Counties Are Using Mechanized Dirt-Moving Equipment As Well As Graders. Doniphan County, Kansas, Used This LaPlant-Choate C-5 Carrimor Scraper Pulled by a Caterpillar RD7 on a Highway Grading Job Near Highland, Kansas.

The Yard with Equipment for Unloading Aggregate and Pre-Coating with Asphalt Emulsion at Lawrence, Ind. See Page 1.
C. & E. M. Photo

Driving H-Beam Piles to Hold The Horizontal Wood Sheeting For the Sixth Avenue Subway In New York City. See Page 8.

The Crushing Outfit in a New Stone Quarry Operated By the Virginia State Highway Department South of Richmond. International Units Furnish the Power.

The End of the Post and Hand Rail Form In Place Ready for Pouring on the Halloran Co. Bridge Job. See Page 1.
C. & E. M. Photo

The Old Biddeford Underpass with its S-Turns Which Was Replaced by the New Underpass Completed Last Fall. See Page 2.
Photo by C. L. English

Looking North Across the B & M RR Tracks During Early Stages of Construction of the Overpass Near Biddeford, Me., Built by the Concrete Construction Co. and the Cerulli Contracting Co.
C. & E. M. Photo

This May Look Like the Bucking Machine For a Football Squad But in Reality Is the Curb and Rubguard Form Used on the Bayou Massey Bridge South of Vicksburg.
C. & E. M. Photo